

93-005

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PROGRAM NAME : Domestic Product Development – Marketplace Driven
PROGRAM COORD. : C. B. Altizer
WRITTEN BY : C. B. Altizer/J. L. Spruill
PERIOD COVERED : First Quarter, 1993

Coordinator Summary: Domestic Product Development Market Place Driven programs to date are in line with commitments forecasted for 1993. Timelines and schedules are in place for the projected launch of Marlboro RX in September. Rep 3 testing of Merit 3mg (Superlights) and Ultima Menthol will be in the field with a meeting scheduled in March with the Brand Manager for additional direction and work necessary to ready product for launch. Virginia Slims King Size products are being readied for qualitative and quantitative research. Parliament Lights Menthol and Marlboro Ultra Lights have factory trial plans in anticipation of possible National launches. Marlboro Extra has been placed "on hold" until re-directed. B&H King Size Ultra Lights is being developed for a possible mid 1994 introduction. A mid-price King Size product program has been listed as a 1993 priority. Product definition for this program is currently being researched. Work will continue for the Low Smoke/Low Odor program utilizing LSS cigarette paper to achieve 60% visibility reduction. Samples are being prepared for CR2978 smoking studies to achieve Phase 4 clearance. No 2nd quarter consumer testing is projected for 100mm De-Nic Menthol products.

I. Objective: B&H King Size Line Extension

Design and develop a B&H King Size Menthol and Regular, Full Flavor and Lights.

A. Strategy III: National Launch

1. **Results:** Production product has been monitored, analytically and subjectively, with a few problems identified and corrected. National relaunch is scheduled in May for Region I, II and IV.
2. **Plans:** Provide assistance, analytically and subjectively, for qualification of two new packers (installation April). Continue monitoring of production product for National relaunch.

II. Objective: Parliament Lights Menthol

Develop a Parliament Lights Menthol LS FTB and 100's SP product for Region I test market. Position product at appropriate tar and menthol per puff to be competitive with Newport Lights, a major competitor in Region I.

A. Strategy III: Modify current design and develop prototypes for 11mg and 13mg tar products acceptable to full flavor menthol smokers.

1. **Results:** Factory trial will be completed by the end of March for both the 11mg and 13mg products. Factory product specifications, reflecting the tow change from FT-107 to FT-777, have been transferred to Operations Services for the trial at Stockton Street.

2. **Plans:** Complete factory trials and cigarette specifications for both the 11mg and 13mg products. Product will be a "shelf" item until required for launch.

III. Objective: Benson & Hedges King Size Ultra Lights

Design and develop a 6mg line extension in regular and menthol versions. Based on predicted liking ratings for cork tipping, products should reflect a 0.7 tpp and an associated mpp of 0.05–0.06. Menthol per puff range and predicted liking ratings reviewed for Salem Ultra Lights, Merit Ultra Lights, True, Salem Lights, Newport Lights and Kool Lights. Products should maintain B&H character.

A. Strategy I: Design and develop prototypes.

1. **Results:** Baseline prototypes were completed at both 6mg and 9mg tar using B&H Deluxe Ultra Lights and Marlboro Ultra Lights fillers. Product at 6mg tar incorporating MFUL filler was considered more acceptable. Based on the tpp and B&H character criteria required for the product, a second generation of prototypes reflecting these criteria is being planned.
2. **Plans:** Complete and evaluate new prototypes, as well as, generate baseline menthol models.

IV. Objective: Merit Ultima (Regular and Menthol)

Support Merit Ultima Launch

A. Strategy III: Design and develop KS/100 menthol line extensions.

1. **Results:** Two replicate POL's each of King Size (04044–04046) and (06021–06023) have been shipped (week of 1/11/93 and 1/18/93). The third replicate POL's (04047 and 06024) are in analytical planned to be shipped in mid March. All POL's used 100% synthetic menthol, an alcohol reduced aftercut and are mentholated via foil and filler. Additional prototypes, incorporating the same mentholated foil and menthol in filler levels, have been completed using CA filters varying the level of menthol PZ. This will attempt to raise the menthol in smoke level and thus the menthol per puff. Samples are being analytically and subjectively evaluated.
2. **Plans:** Complete and compare third replicate testing. Complete evaluations of CA filter prototypes.

V. Objective: 3mg Merit (Superlights)

Design and develop a 3mg product with the subjective attributes of a 6mg cigarette.

A. Strategy III: Evaluate prototypes

1. **Results:** POL 02081 (Blend 387 (NET)/CA filter), second replicate, was completed giving results comparable to replicate one. The third POL 02100 was in the field the week of 2/1. This test differed from the first two, in that, the current NET formula is being incorporated vs. special NET for Merit 3mg: #18 Bright replacing #10 Bright and MTP Burley replacing C34 Burley.

2. **Plans:** Data comparison of POL 02100 with the first two replicate tests.

B. Strategy V: DIET Prototype Development (Back-up position)

1. **Results:** Additional prototypes are under evaluation for Blend 298 (38% JET). Burley spray application rate and type are being used to adjust mainstream taste to a less harsh/smooth smoke.
2. **Plans:** Complete prototype evaluations and be in a position to do consumer tests should launch date be prior to NET availability.

VI. Objective: 6mg Merit

Design and develop a 6mg product with the subjective attributes of an 8mg cigarette.

A. Strategy V: Consumer Testing

1. **Results:** POL 02096 (MFUL Blend, Ultima Bright casing, MFUL aftercut) gave results comparable to an 8mg tar product. Replicate tests 02102 and 02106 are scheduled for testing in March. Prototypes are continuing incorporating NET in the MFUL Blend at same (20%) and higher inclusion rate (23%).
2. **Plans:** Evaluate next generation models. Prepare prototypes for replicate POL testing in June.

VII. Objective: Virginia Slims King Size

Design and develop King Size Menthol and Non-Menthol line extensions in 24.0 circ. by 83mm length. Non-menthol product having 1.3 tpp (@ 11mg) for Lights and a 1.4 tpp (@ 13mg) for Medium. Menthol products have 1.4 tpp/.07-.075 mpp for Lights and 1.6 tpp/.07-.075 mpp for Medium.

A. Strategy II: Consumer Testing

1. **Results:** Three replicate POL's were completed for the Lights product (11mg tar). Two replicates for the Medium product (13mg tar) were completed with the third replicate in the field.
2. **Plans:** Review and decide from consumer testing data if additional testing is required for the non-menthol prototypes.

B. Strategy III: Design and develop cigarette specifications for menthol companions at 11mg and 13mg tar.

1. **Results:** POL's 04047 (Lights/Rep 1) and 04048 (Medium/Rep 1) were completed but did not achieve tar, tpp or mpp targets. Additional models are being requested for both Lights and Medium using, MB4B and Virginia Slims Menthol fillers.
2. **Plans:** Complete additional prototypes and select appropriate models for consumer testing to be completed by the end of July.

C. Strategy: Market Research Testing

1. **Results:** Meetings with the Brand Manager and Engineering have resulted in qualitative testing scheduled for March using concept cards, handmade "Booklet" pack prototypes and Lights/Medium Menthol and Non-Menthol product. Quantitative testing is scheduled for April using similar dimensions.
2. **Plans:** Prepare products for quantitative testing.

VIII. Objective: Marlboro Extra

Develop KS 80/83mm full flavor/lights products at an increased circumference.

A. Strategy II: Address issues necessary to accommodate R&D and production concerns.

1. **Results:** Installation of cigarette making equipment has been postponed indefinitely. MF Extra is a shelf product which can be reactivated and updated should the need be dictated by Camel Wides performance in the marketplace.
2. **Plans:** Activity postponed.

IX. Objective: Marlboro Express

Develop a 72mm x 24.8mm full flavor, lights and medium line extensions subjectively similar to the current Marlboro Red, Lights and Medium products.

A. Strategy V: Machinery Development

1. **Results:** Timelines have been issued for SP and FTB machinery installations in Louisville. Cigarette product has been readied for tune/testing equipment at York Engineering.
2. **Plans:** Continue to provide support to Engineering as required.

B. Strategy VI: Factory Trials

1. **Results:** Factory simulated runs have been conducted on LS equipment to confirm analytical data for preliminary specifications. Product was made to weight and cut to 72mm length.
2. **Plans:** Factory trial scheduled in Louisville on production RX makers 4/27/93.

C. Strategy VII: Production Start-up

1. **Results:** Production equipment timeline developed by Engineering with the first module scheduled to start-up 5/18/93 for the SP and 6/1/93 for the FTB in Louisville.
2. **Plans:** Provide support to all departments for production.

X. Objective: Marlboro Ultra Lights

Develop 6mg line extension in KS and 100mm providing enhanced subjective quality and Marlboro character. Incorporate 10-078-A cigarette paper for optimum puff count control.

A. Strategy I: Cigarette Paper Study

1. **Results:** 10-078-A (former 10-058-A paper) paper yielded a lower standard deviation around the puff count at higher ventilation levels versus the 46 coresta/increased citrate control.
2. **Plans:** Conduct factory trial to confirm preliminary specifications.

XI. Objective: Consumer Testing

Generate a database of strength and liking scores for PM and competitor's products to identify new product opportunities and product/process improvements.

A. Strategy I: Routine Testing of Philip Morris and Competitor's Product

1. Results:

Number of tests completed	17
Number of tests shipped	15
Number of tests in progress	7
Number of tests projected for 2nd Qtr.	16

2. **Plans:** Initiate and complete projected 2nd Qtr. testing.

B. Strategy II: Supply Product For Non-Standard POL's

1. Results:

Number of tests completed	10
Number of tests shipped	6
Number of tests in progress	1
Number of tests projected for 2nd Qtr.	9

2. **Plans:** Initiate and complete 2nd Qtr. testing.

C. Strategy III: POL's For New Product Development

1. Results:

Number of tests completed	9
Number of tests shipped	8
Number of tests in progress	4
Number of tests projected for 2nd Qtr.	2

2. **Plans:** Initiate and complete 2nd Qtr. testing.

D. Strategy IV: POL's For Product/Process Improvement Programs

1. Results:

Number of tests completed	3
Number of tests shipped	2
Number of tests in progress	6
Number of tests projected for 2nd Qtr.	1

2. **Plans:** Initiate and complete 2nd Qtr. testing.

XII. Objective: Marketing Program Support

To support Marketing and Marketing Research efforts in the areas of focus groups, ad packs and packaging concept tests to provide cigarette prototypes, special packings and product information necessary to access feasibility of concepts.

A. Strategy I: Provide Product As Requested

1. **Results:** Product has been supplied for either focus groups, packaging comps and visual samples for the following program:

Virginia Slims King Size

2. **Plans:** Provide product, as required.

XIII. Objective: Low Smoke/Low Odor (Developmental Support)

Develop a flavor agent for use in a cigarette designed to deliver a more acceptable sidestream with a non-distinct aroma (Ambrosia).

A. Strategy: To develop a commercial method for the production of CR-2978, a release agent for α -HCA.

1. **Results:** Extensive trials were conducted to establish the conditions, stoichiometry, and reagents for the synthesis of CR-2978. This process uses reagents and conditions which are suitable for larger scale production of CR-2978. The synthesis give an overall yield of >75%. Large quantities of CR-2978 (>2 lbs.) were produced and delivered to FT for evaluation. Additional 10 lbs. of this material are currently being made at Chemical Research.
2. **Plans:** Complete the preparation of 10 lbs. of CR-2978 and deliver it to FT.
3. **Conclusions:** CR-2978 has been shown to release α -HCA. It has been prepared in large quantities and is available for further studies.
4. **Contributors:** Chemical Research – Projects 2520 and 2500.
5. **References:** Notebook numbers 9166, 9175, 9178.

B. Strategy: To find a producer for CR-2978 and to manufacture 25 lbs. of this material.

- 1. Results:** After initial discussions with over 10 companies, SpecialtyChem Products Corp. and Aldrich Chemical Co. were selected as potential producers of CR-2978. An evaluation was carried out of all potential sources of raw materials. A supplier for each of the key raw materials was chosen and arrangements were made so that these materials would be available on a timely basis. A complete technical package covering synthesis specifications, and contract issues was prepared for CR-2978 manufacture. Site visits were conducted to SpecialtyChem Products Corp. and Aldrich Chemical Co.

Aldrich Chemical Co. was chosen and contracted for the production of 25 lbs. of CR-2978. Materials Safety Data Sheets were written for both CR-2978 and its precursor CR-2977. Production was started at Aldrich with delivery targeted for as close to June 1 as possible.

- 2. Plans:** Complete the production of 25 lbs. of CR-2978 at Aldrich Chemical Co. Conduct additional experimental trials as required in order to be able to produce this material on a 1,000 to 2,000 gallon scale, if needed.
- 3. Conclusion:** CR-2978 can be produced in large scale and will soon be commercially available.
- 4. Contributors:** Chemical Research – Project 2520 and 2500.

XIV. Objective: Low Smoke/Low Odor (Developmental Support)

Develop a flavor release agent for use in a cigarette designed to deliver a more acceptable sidestream with a nondistinct aroma (Ambrosia).

A. Strategy: Design, synthesize and evaluate α -hexylcinnamaldehyde (HCA) release systems for incorporation in the cigarette paper, for delivery of HCA to sidestream.

- 1. Results:** The preparation and evaluation of 3-benzylidene-1-(3,5,6-trimethyl-2-pyrazinyl)-nonan-2-ol (CR-2950) has been completed. A 100g sample was delivered to Flavor Technology for evaluation. The material pyrolyzed smoothly to give HCA and tetramethylpyrazine. It gave good subjectives and was also found to be stable under extended aging conditions. However, under smoking condition a fair amount of CR-2950 was transferred unchanged, and this result was considered unacceptable.

4-Hexyl-3-hydroxy-2,2-dimethyl-5-phenyl-4-pentenoic acid (CR-2966) has been prepared by the condensation of HCA and isobutyric acid. The β -hydroxy acid was converted to the calcium salt. Pyrolysis of the latter at 300°C, both HCA and isobutyric acid were obtained. The presence of significant amounts of isobutyric acid in the pyrolyzate suggested that the material is not suitable as a release agent. Therefore, a different β -hydroxy acid was sought. The reaction of diethylacetic acid with HCA gave the desired 2,2-diethyl-3-hydroxy-4-phenylmethylidenedecanoic acid (CR-2977), which was converted to the corresponding calcium salt (CR-2978) by reaction with calcium hydroxide.

Pyrolysis of the calcium salt on paper at 300°C gave mainly HCA and small amount of diethylacetic acid.

The preparation of poly(vinylacetals) derived from HCA is being explored. A literature search on the subject has been completed and a number of poly(vinylalcohol) samples have been ordered.

2. **Plans:** Evaluation of CR-2978 will be incorporated into paper. Smoke analysis, aging studies and subjectives will be done on machine made cigarettes. The chemistry of poly(vinylacetal) derived from HCA will be investigated in detail. In addition, microencapsulation will be evaluated as a method to release HCA.
3. **Conclusions:** HCA is the only known available flavor that has a "neutralizing" effect on sidestream. HCA appears to reduce the intensity of sidestream without imparting any distinct aroma. Therefore, we will continue to focus on methods to release this flavor into sidestream.
4. **Contributors:** Chemical Research – Projects 2520 and 2500.
5. **References:** Notebook numbers 9040, 8889.

XV. Objective: Low Smoke/Low Odor (Analytical Support)

- A. Strategy:** To determine the degree of vanillin substitution in Aqualon vanillin derivatized cellulose by ^{13}C CPMAS NMR, as well as, evaluation of the integrity of the vanillin aldehyde functionality.
1. **Results:** In most samples, the vanillin aldehyde functionality has been oxidized to a carboxylic acid.
 2. **Contributors:** J. Wooten

XVI. Objective: Low Smoke/Low Odor (Product Development)

Design and develop KS/100mm products incorporating Product Technologies, i.e.: low sidestream, low aroma and combinations thereof.

- A. Strategy:** Design and develop 23.0, 24.0 and 24.8 King Size/100mm products using heavy basis cigarette paper giving 60% visibility reduction in sidestream.
1. **Results:** Requests are being submitted using old and new LSS paper incorporating MF Lts., Va. Slims Lts. and Merit filler. Samples will be made using CA filters and will be analyzed for CI data and visibility reduction.
- B. Strategy:** Release Compound Studies
1. **Results:** Primary and make pack requests have been submitted for models incorporating LSS, LSS/CR2978, control, conventional paper/CR2978 for in-house analytical evaluations.
 2. **Plans:** Complete samples.

INTEGRATED MODELLING & DATABASE MANAGEMENT

XVII. Objective: Design and implement an integrated modelling and database management system for Product Development.

A. Strategy II: System Design.

1. **Results:** Work continues on defining the user interfaces using MicroSoft's Visual Basic as a design tool. Eight of the 27 PC's have been ordered through CAD and are expected to be installed during March. The remaining PC's are planned to be installed prior to August, in order to start the training effort before the end of the year.
2. **Plans:** Continue working on the user interface definition and continue working with CAD personnel in defining the data interfaces.

Continue to observe the information flow through Product Development and present initial user interfaces to the initial group of users.
3. **Contributors:** R. Adkins, B. Good

XVIII. Objective: Project De-Nic

Develop a family of subjectively acceptable Ultra Low, Low tar and Full Flavor menthol products from filler which, through supercritical CO₂ extraction, has a residual nicotine level of <0.1%.

- A. Strategy:** Development of a Menthol family of De-Nic products at Ultra Low, Low tar and Full Flavor delivery levels.
1. **Results:** POL tests 06017, 06018, 06019 and 06020 (De-Nic Menthol 100mm at 16, 11, 9 & 6mg tar, respectively) were completed showing the 6mg product as the most acceptable. Two extractions were completed at Bermuda Hundred. This filler, along with unextracted filler, will be blended, with cigarette prototypes completed, to support the Sensory Technology Group.
 2. **Plans:** No activity for consumer testing planned for second quarter. Complete Sensory Technology prototypes.

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PROGRAM NAME : Domestic Product Development – Operations Driven
PROGRAM COORD. : Vivian E. Willis, Chris Kroustalis, George Yatrakis
WRITTEN BY : Vivian E. Willis, Chris Kroustalis, George Yatrakis
PERIOD COVERED : First Quarter, 1993

NET INCLUSION

I. Objective: Replace DIET with NET in all Premium Brands (except Marlboro FF and Lights) and increase the inclusion rate by 3%.

A. Strategy: Evaluate the substitution of NET for DIET processed tobacco at current and increased levels.

1. **Results:** POL tests of B&H Full Flavor 100's SP (POL 05059) and Merit KS (POL 02092), both with 15% NET inclusion, were completed. Results indicated no significant differences between either test product and its respective control region. Replicate tests of the above two products, POL 05069, B&H Full Flavor 100's SP, and 02126, Merit KS, (both with 15% NET inclusion) were shipped the first week in March, 1993.

Merit Ultra Lights KS with 25% NET, POL 02127, was produced and is scheduled for shipment the week of March 1, 1993. B&H Menthol 100's Full Flavor with 15% NET, POL 06041, is scheduled for shipment the week of March 8, 1993. Both of these prototypes were produced with blend formulas that reflect the March 1, 1993 RL change.

Prototypes for internal subjective evaluations have been produced for the following brands: Marlboro Ultra Lights KS, Virginia Slims Full Flavor, Virginia Slims Ultra Lights, Parliament and Lark Full Flavor KS. Analyses and subjective evaluations are in progress

2. **Plans:** Complete analyses and internal subjective evaluations of recently produced prototypes. Produce, analyze and subjectively evaluate (internally) NET prototypes of B&H Deluxe Ultra Lights. Review all POL test results and schedule, if necessary, POL tests for the 3rd–4th quarter, 1993 to evaluate key brands with factory produced NET. Schedule International subjective tests (Danchi, SCP, etc.) for the evaluation of key brands that will be affected by NET inclusion. Coordinate the subjective qualification of the Bermuda Hundred NET Processing Facility.

3. **Contributors:** B. Taylor, B. Peacè, C. Moogalian

MULTIFILTER CUT FILLER CONSOLIDATION

II. Objective: Eliminate the unique aftercut applied to Multifilter; Evaluate changing to the Merit aftercut system.

A. Strategy: Produce prototypes with the Merit aftercut system for internal subjective evaluations.

- 1. Results:** No activities this reporting period.
- 2. Plans:** Produce and evaluate prototypes; make recommendations in the 2nd quarter.

WOOD PULP PAPER UTILIZATION

III. Objective: Incorporate Wood Pulp paper on all PM Premium Brands with no change in subjective attributes.

A. Strategy: Produce and evaluate, both subjectively and analytically, Marlboro prototypes incorporating Wood Pulp papers.

- 1. Results:** Prototypes were produced with various Wood Pulp/Flax papers received from the Paper Technology Group. Wood Pulp content of these papers ranged from 38 to 70%. Subjective evaluations have indicated that the 38% Wood Pulp/62% Flax paper model had the least negative subjective attributes when compared to a control Marlboro (although internal subjective panels still indicated that the test was different). Papers with lower Wood Pulp content have been requested by the Paper Technology Group for additional evaluations.
- 2. Plans:** Produce and evaluate prototypes using the new papers; select best candidates to date based on internal subjective evaluations. POL test candidates during the third quarter, if warranted.
- 3. Contributors:** J. Pflueger, M. White, Paper Technology Group

MENTHOL APPLICATION STRATEGIES

IV. Objective: Evaluate alternative methods of menthol application for the Menthol-on-Foil Process

A. Strategy: Evaluate the potential for replacing Menthol-on-Foil (MOF) with Spray Mentholation.

- 1. Results:** A scenario is being developed describing the impact to Primary Operations, Cigarette Fabrication and the finished product if MOF is replaced with Spray Mentholation. This scenario attempts to minimize the number of additional cut fillers and aftercuts that would be necessary if Spray Mentholation is implemented.
 - 2. Plans:** Develop an Operational Plan and timetable based on the scenario developed for presentation to management in the second quarter.
- B. Strategy:** Evaluate the new Kaymich FDU-3 Flavor Applicator as an alternate method for applying menthol.

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1. **Results:** A scenario is being developed describing the impact to Primary Operations, Cigarette Fabrication and the finished product if all Menthol application is converted to a Kaymich Applicator. This scenario includes the total number of Kaymich units that would be necessary to convert Louisville Factory. Additionally this scenario includes the number of aftercuts that can be eliminated as well as consolidation of cut fillers.
2. **Plans:** Develop an Operational Plan and timetable based on the scenario developed for presentation to management in the second quarter.
3. **Contributors:** H. Maxwell, W. Thomas.

PROJECT LEVO

- V. Objective:** Develop synthetic menthol products to decrease PM's dependence on natural menthol.
- A. Strategy:** Develop and evaluate synthetic menthol based flavor systems as a replacement for natural menthol.
1. **Results:** Two POL tests of B&H Menthol KS with 100% synthetic menthol were completed this reporting period. Results indicated that both products were not significantly different from their control regions. Prior testing of B&H 100's Menthol and Merit Menthol, both with 100% synthetic menthol, also indicated no differences with their respective control regions. A completion report is being written.
 2. **Plans:** This program is complete. No further development activities are planned.
 3. **Conclusions:** When the business need arises, PM can substitute synthetic menthol for natural menthol with no subjective differences in the products.
 4. **Contributors:** J. Shelton, M. White, M. Fleming

FLAVOR REVISIONS

- VI. Objective:** Reduce ingredients from PM Direct Materials to meet PM standards and comply with worldwide legal requirements, reduce and simplify ingredients sources and assist the Flavor Center with evaluations of quality and flavor issues.
- A. Strategy:** Subjectively evaluate revisions and first shipment samples from vendors where ingredients have been removed and determine acceptability.
1. **Results:** During this reporting period, one flavor was removed from the system due to a regulatory issue and two samples were received, evaluated and approved as first shipment samples.
 2. **Plans:** Presently there are no outstanding revision requests.

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3. **Contributors:** J. Pflueger, D. Williams, C. Comes, P. Andrews
- B. **Strategy:** Identify alternate vendor flavors for current Direct Materials and evaluate submissions for approval.
 1. **Results:** Two alternate vendor products were subjectively evaluated and approved for use.
 2. **Plans:** Alternate vendor samples will be subjectively evaluated as needed.
 3. **Contributors:** J. Pflueger, C. Comes, P. Andrews
- C. **Strategy:** Reduce flavor and flavor components to meet PM standards, comply with worldwide legal requirements and reduce the number of sole source ingredients.
 1. **Results:** Twenty one Direct Material flavors from one supplier that were duplicated last year are scheduled to be removed from the system during 1993. Implementation of the revised formulas will occur based on inventory depletion of the original flavors. Two flavors have been removed during this reporting period.

A revised Merit flavor concentrate for use in Europe was POL tested domestically on Merit. Results indicated that this revision was acceptable for use. As this flavor concentrate is also used on several other brands produced in Europe, nineteen (19) liters of the revised flavor have been shipped to Germany for additional evaluations.

Twelve (12) flavors from one supplier are being evaluated for removal from the PM Direct Materials list. Six (6) of the flavors have been reformulated, evaluated and completed. The remaining six (6) flavors are under subjective evaluation.
 2. **Plans:** Evaluations and transmittals will occur as requested by Regulatory and Technical Services.
 3. **Contributors:** J. Pflueger, M. B. Lambert, D. Williams
- D. **Strategy:** Assist the Flavor Center with subjective evaluations on flavor quality related issues.
 1. **Results:** Five (5) Direct Material coded products were subjectively evaluated against control samples and approved.

Due to the high rejection rate of Glen by the Flavor Center, (10% rejection rate) prototypes were produced using control Glen and a sample of Glen deliberately made with accentuated fatty notes. Subjective evaluations of these prototypes indicated the "test" Glen to be unacceptable, confirming that a high level of fatty notes in Glen is unacceptable.
 2. **Plans:** Continue to support the Flavor Center with subjective evaluations on flavor quality related issues
 3. **Contributors:** J. Pflueger, H. Maxwell, P. Andrews

MARLBORO

Coordinator Summary: This program is on schedule. Implementation of BLT (RCBT, RLCT and RLBT) has been initiated. Internal and external testing is scheduled to monitor Marlboro.

VII. Objective: To improve cost effectiveness of the Marlboro blend.

- A. Strategy:** To implement BLT (unwashed burley stem, reduced humectants and liquid flavor).
 - 1. Results:** Implementation of BLT was supported in February.
 - 2. Plans:** Continue with planned activities support as needed.
- B. Strategy:** Increase the expanded tobacco in full margin brands.
 - 1. Results:** No activity planned this quarter.
 - 2. Plans:** Assist Leaf Blending with the 14% BLDET blend development which will be initiated in April. Prototypes and internal evaluation will follow. POL testing is scheduled for June, July and August with factory trials in September. Implementation of the 14% BLDET is scheduled for November, 1993. Continue with planned increases in expanded tobacco evaluations and support implementation as scheduled.
- C. Strategy:** Increase content of offshore tobaccos in premium brands.
 - 1. Results:** Factory trials for the addition of two cases of offshore Bright to BLDET were conducted. Analytical and subjective evaluations are incomplete at this time.
 - 2. Plans:** Complete evaluations. Make subjective base recommendations and support implementation. Additional offshore inclusions will be investigated in DBC Burley. The blend development for the offshore burley inclusion will be initiated in April. Implementation of the first inclusion level has been scheduled for July and the second for September, 1993. Members of the Product Development Directorate will support Leaf Blending in blend development, factory trials, specifications, subjectives, analyticals and implementation.
- D. Strategy:** Investigate discount pool tobaccos for inclusion in premium brands if quality of leaf warrants it.
 - 1. Plans:** Assist Leaf Blending with subjectives and analytical data as needed. Support implementation as needed.
 - 2. Contributors:** S. Ruziak, K. Deane, B. Woodson, M. White, T. Gannon, D. Atkinson, A. Smith, M. Jeltima, R. Keatts, J. Hutchinson, Semi-Works, CTSD and ARD.

PROJECT GRAIN

VIII. Objective Summary: This program is on schedule. Implementation of Phase I Grain has been initiated.

A. Strategy: Implement Phase I Grain.

- 1. Results:** Implementation of Phase I Grain was initiated in February. Phase I Grain consists of 100% alcohol removal in the burley top casing and 5% alcohol reduction in the aftercuts. The alcohol reduced flavor system was implemented on Merit cut filler for Egypt.
- 2. Plans:** Continue with planned activities support as needed.
- 3. Contributors:** S. Ruziak, B. Woodson, K. Deane, M. White, R. Rainey.

B. Strategy: Reduce/rearrange PG in flavor system in combination with alcohol-free burley top casing and aftercut reductions.

- 1. Results:** POL 03044 with 67% alcohol and 25% PG reductions achieved subjective parity with the Marlboro Control.
- 2. Plans:** Additional testing will be conducted with 52% total alcohol reduction. Factory trials will be conducted during the second quarter. Following successful POL's, factory trials will be conducted with 67% total alcohol and 25% PG reduction during the third quarter 1993.
- 3. Contributors:** S. Ruziak, B. Woodson, K. Deane, D. Atkinson, A. Smith, M. White, D. Sweeney, R. Rainey, Semi-Works, CTSD and ARD.

C. Strategy: Remove all alcohol from aftercuts in Australian brands to conform with government flash point requirements.

- 1. Results:** Eleven Australian factory trials were conducted in October, 1992 on Marlboro, Alpine, Star and Phoenix flavor systems. Analytical and subjective evaluations are complete. The best model was chosen for each brand. Additional testing is being conducted in Australia.
- 2. Plans:** Additional trials will be conducted to confirm initial results. Support implementation as needed.
- 3. Contributors:** S. Ruziak and H. Maxwell.

ALTERNATE HUMECTANTS

IX. Objective: Produce flavor systems and reconstituted tobacco materials with alternate humectants for cost reduction and defensive purposes.

A. Strategy: Develop and evaluate alternate humectants replacing propylene glycol and glycerin in sheet products.

1. **Results:** RLT and RLB reconstituted materials were produced at Park 500 using isosweet to replace propylene glycol and glycerine.
2. **Plans:** Produce RCB using isosweet to replace propylene glycol and glycerin in March. BLDET and expanded stems will be produced early in the second quarter. Survivability studies and microbiological evaluations will be conducted on the reconstituted materials. Prototypes will be evaluated internally and selection of the best model for POL testing will be made. A baseline POL is scheduled for the third quarter.
3. **Contributors:** S. Ruziak, J. Swain, B. Hoskin, B. Taylor, M. White, Park 500, Semi-Works, CTSD, ARD and D. Chadick.

MARLBORO RI

IX. Objective: Develop a Marlboro flavor system containing fewer than 40 listed components which support the subjective character in Marlboro cigarettes.

A. Strategy: Develop new reduced-ingredient flavor systems and subjectively evaluate blend modifications.

1. **Results:** Park 500 trials of RLL were completed during Thanksgiving shutdown. POL 03017 was prepared and released for shipment. The POL test will close on March 22, 1993.
2. **Plans:** Repeat POL testing with modification in flavors and/or blend, if warranted. Make subjective based recommendations.
3. **Contributors:** B. Taylor, L. Vinson, J. Swain, L. Wilkinson, Semi-Works, CTSD, ARD, Park 500, BL Plant, ES/IS Facility, R. Keatts and R. Rainey.

LICORICE REPLACEMENT

X. Objective: Develop current Burley Spray processing specifications for factory primaries. Investigate potential licorice substitutes and consolidate generic products casing systems.

A. Strategy: Evaluate reduced holding temperature for current Burley Spray.

1. **Results:** No activities planned this quarter.

B. Strategy: Evaluate the replacement of sucrose with isosweet in Brica Burley Spray.

1. **Results:** Internal testing shows subjective differences with sucrose versus isosweet.
2. **Plans:** Repeat testing with current blend.
3. **Contributors:** W. Bell, D. Spruill, J. Sherron, M. White, CTSD, ARD and Semi-Works.

C. Strategy: Remove licorice and replace Baker's chocolate in current Burley Spray.

1. **Results:** Marlboro-type models without licorice and with Baker's chocolate replacement were evaluated. POL's 03078 and 03085 with licorice removal (100 and 50%, respectively) have been completed.
2. **Plans:** Additional POL's will be made with 50% and 100% licorice removal during the second quarter using the current Marlboro blend.
3. **Contributors:** W. Bell, D. Spruill, J. Sherron, M. White, CTSD, ARD, Semi-Works and PED.

SUBJECTIVE PANELS

XI. Objective: To provide subjective evaluation of prototypes, modifications of existing brands, new brands and competitors' products.

A. Strategy: Conduct evaluation for development programs, monitoring of domestic competitive brands and any problems associated with production and/or processing plants.

1. **Results:** Seventy-five (75) panels were completed on the Domestic Panel this quarter. Subjective characterization of 35 domestic brands were completed (29 premium and 16 generics). Sixteen POL's were evaluated before overtipping.

The following brand start-ups for the different factories were subjectively monitored at the factories' requests (new brand start-up includes products that are new to a specific factory and new equipment):

CAB	Cambridge 85 and 100 mm (Full Flavored, Lights and Ultra Lights).
LVL	Marlboro KS, Marlboro Lights KS and FTB, Cambridge Lowest 100 mm SP and B&H Menthol 100 mm.
MC	Marlboro KS and LS, and Marlboro Lights KS and FTB
SS	B&H Special Kings Regular and Menthol, Philip Morris Lights, Bronson 85 mm Regular and Menthol and 100 mm SP Menthol, Marlboro LS and Marlboro Lights FTB.

The Semi-Works panel continues to evaluate the Merit Metallized Foil overwrap extended storage study samples from Ambient, Cold and Warehouse conditions.

2. **Plans:** Continue to provide subjective support for the evaluation for development programs, monitoring of domestic competitive brands and any problems associated with production and/or processing plants. Complete the subjective testing with alternate films and multi-layered films.
3. **Contributors:** K. Deane, J. Gear, Flavor Technology Domestic Panel, Film Panel and Semi-Works Panel.

XII. Objective: To provide training, maintenance and support to auxiliary panels (e.g., Richmond, Semi-Works, Filter and Paper and Cast Leaf Panel).

A. Strategy: Train auxiliary panels to screen development prototypes and to judge acceptability of final products.

1. **Results:** Training continues with the Semi-Works, Filter and Paper and Cast Leaf panels.
2. **Plans:** Continue training of all new panels on new blends, products and modifications of products as time permits.
3. **Contributors:** K. Deane, C. Scott, Flavor Technology personnel, Semi-Works, Cast Leaf and Filter and Paper Panel members.

XIII. Objective: To provide subjective evaluation of development prototypes, modifications of existing International brands and export (PM and competitors' brands).

A. Strategy: Continue to monitor existing International brands and provide subjective evaluations for prototype development. Provide further training to standardize panels.

1. **Results:** The International panel training continues. Ten panels were completed on the International Panel this quarter. Subjective characterization of eight international brands were completed. Subjective monitoring of new brand startup include the following (new brand startup includes products that are new to a specific factory):

Lark Milds FTB and KS

Parliament 85 and 100 mm SP

Parliament Lights 85 and 100 mm SP

Chesterfield Lights and Full Flavor 100 mm SP

Philip Morris Super Lights 85 mm SP

Philip Morris Lights 85 mm SP

2. **Plans:** Continue subjective support for developmental programs, new product development, storage issues and competitors' products profile. Continue training for the International panel and the recruitment of new panelists.
3. **Contributors:** K. Deane and International Panel.

MARLBORO STANDARDIZATION

XIV. Objective: To identify and reduce the source of variation in PM brands between production and processing facilities.

A. Strategy: Conduct factory pickups and a standard run to monitor the quality of Marlboro by subjective and analytical testing.

1. **Results:** Marlboro Standardization Run X final report was completed and issued. Products from the November blend change were subjectively monitored by the Flavor Technology Panel and the Richmond Panel. A Marlboro pickup was conducted on December 17, 1992. Subjective evaluations are completed and an interim report has been issued.
2. **Plans:** Evaluate cigarettes from the February blend change on the Marlboro Standardization Panel in Marlboro, Marlboro Medium and Marlboro Lights configurations.
3. **Contributors:** K. Deane, Marlboro Standardization Panel and the Factory Panels.

XV. Objective: Provide training, maintenance and support to factory panels which could possibly identify and reduce sources of taste/odor/stale customer complaints.

A. Strategy: Conduct training for factory panels and quarterly panel leader workshops. The factory panels will monitor their daily production which could identify and possibly reduce taste/odor/stale customer complaints. Factory panels will also evaluate factory pickups and Standard Runs for monitoring purposes.

1. **Results:** Due to changes within the factories, training was suspended in the fourth quarter of 1992.
2. **Plans:** New panel leaders and members for all three shifts were recruited in Cabarrus. The Manufacturing Center and Stockton Street have identified panel leaders. Training for all locations will be initiated in March. Louisville is currently running both the regular and menthol panels on "A" shift. Louisville and Stockton Street will have "A" shift panels only.

3. **Contributors:** K. Deane and Factory Panels.

XVI. Objective: Subjectively test externally (POL testing) Marlboro products from the different locations to aid in defining/confirming Marlboro control regions and developing new statistical methods.

A. Strategy: POL testing (monadic evaluation) of scheduled factory pickups and cigarettes produced from Standard Run XI. This will aid in defining Marlboro control regions and develop new statistical methods.

1. **Results:** POL testing of the Marlboro KS and FTB with November, 1992 blend modification and filter change continue. The POL testing includes all factory locations and Semi-Works. All POL's were monitored by members of the Product Development Directorate through processing and cigarette making.
2. **Plans:** Continue testing the production of Marlboro SP and FTB through 1993. This testing will include blend modifications being made throughout the year. All POL's will continue to be monitored by members of the Product Development Directorate.
3. **Contributors:** A. Smith, M. Jeltema, D. Atkinson, S. Ruziak, B. Woodson, K. Deane, M. White, CTSD, ARD, Semi-Works and factories.

PROCESSING PLANT SUPPORT

Coordinator Summary: Support for implementation at the processing plants and evaluation of RCBT and reduced humectant RL's prior to substitution in factories (February 26) continue. Various trials at the BL Plant in collaboration with Reconstituted Tobacco Development, Leaf and Engineering personnel are presented below. Results of evaluations of RLB produced on Line 3 (Weigard Evaporator) will be covered next quarter. Other RCBT projects at the Flavor Center and Stem Expansion facilities have also shown progress.

XVII. Objective: To support production and utilization of RCBT (liquid flavor, unwashed burley stem and reduced humectants) from the BL Plant.

A. Strategy: Specification and subjective support for implementation of RCBT at the BL Plant in November, 1992. Support introduction of RCBT and reduced humectant RL's in Marlboro cigarettes in February, 1993.

1. **Results:** RCBT was implemented in February, 1993.
2. **Plans:** Continue to support RCBT production as needed.
3. **Contributors:** B. Hoskin, S. Ruziak, B. Taylor, J. Swain, M. Parker, G. Gellatly, L. Vinson, Semi-Works, R. Hatcher, CTSD and ARD.

XVIII. Objective: To evaluate feedstock blending and substitutions to address issues of consistency and quality.

A. Strategy: To evaluate variations in feedstock blending and stemmery reclaim dust production.

1. **Results:** RCBT Pilot trials were made with reclaimed stemmery dust (Bright and Burley) in three substitution formulations. Two substitution formulations with normal (33%) and reduced (30%) burley stem levels were selected for production trials. Due to concerns of blending, the test production dust feedstock was preblended at R&D for comparison to normal BL Plant infeed blending. Trials in March will also evaluate variations in the current blending process with iron analyses to trace blending of Tidewater dust in the normal infeed. Analytical tracing will also evaluate variations with mixing in the Vertamix tanks to potentially reduce variation.
2. **Plans:** Complete analytical and subjective evaluations and make subjective based recommendations to Leaf and Engineering.
3. **Contributors:** B. Hoskin, S. Ruziak, B. Taylor, J. Swain, M. Parker, G. Gellatly, L. Jennings, E. Patterson, L. Vinson, Semi-Works, ARD and CTSD..

XIX. Objective: To support cooked flavor production, qualification of alternate vendors and automation/scale-up of the reactor at the Flavor Center.

A. Strategy: Implement and establish specifications for alternate vendor ingredients in cooked flavor and support qualification of an automated/scale-up reactor at the Flavor Center.

1. **Results:** Transmittals have been made to Technical Services for formulations and initial specifications for implementation of alternate vendor ingredients in cooked flavor. Upon completion of analyses by the Materials Specification Group, implementation and monitoring will be scheduled.

Flavor Technology, ARD and Technical Services personnel are involved in supporting the automation/scale-up of the cooked flavor reactor at the Flavor Center. Development of additional analytical procedures are in progress to supplement current procedures and subjective evaluations to duplicate cooked flavor from the modified system.

2. **Plans:** Complete implementation and specifications of alternate vendor ingredients in production in the second quarter. Continue to support Engineering and Analytical Group to qualify cooked flavor from the modified system in the third quarter of 1993.
3. **Contributors:** B. Hoskin, J. Swain, W. Thomas, S. Johnson, B. Monahan, ARD, CTSD and Semi-Works.

XX. Objective: Conduct subjective and feasibility studies of burley stem usage through ES and IS processes to reduce cost of discount products.

- A. **Strategy:** Substitute Burley for Bright stems in both ES and IS at a blend rate which can be subjectively modified to replace current IS in discount products. Due to common infeed for ES and IS, strategy was to blend these final products to utilize both processes or the modified stem feedstock.

1. **Results:** Large-scale expansion trials of ES and IS were completed in Louisville with 30% Burley replacing Bright stems. Uncased, normal cased and modified casing trials were made for evaluation in collaboration with Leaf personnel. Although physical testing showed comparable or slightly higher CV's for the test products, sieve analyses showed higher fines (35 mesh + pan) which were anticipated with Burley stems. After subjective selection and evaluations replacing IS (Bright stems) in discount blends, larger scale trials will be made to resolve physical issues.
2. **Plans:** Subjectively evaluate test ES/IS products in discount blends and recommend further trials of selected tests in Louisville.
3. **Contributors:** B. Hoskin, J. Swain, L. Jennings, W. Thomas, L. Vinson, Semi-Works, ARD and CTSD.

FACTORY SUPPORT

XXI. Objective: To provide support for the subjective qualification of factory primary modernization programs.

- A. **Strategy:** Qualify new P&S Dryer at the Manufacturing Center.

1. **Results:** P&S Dryer No. 2 has been qualified for use at both single and double rates.
2. **Plans:** Qualify P&S Dryer No. 1 at single rate in March, 1993. Qualification of new Dryer No. 1 at double rate is scheduled for the second quarter, 1993.
3. **Contributors:** D. Spruill, W. Bell, J. Sherron, R. Rainey, R. Bowman and S. Rudis.

B. Strategy: Qualify DIET stem reclamation from the VT separator.

1. **Results:** R&D testing of reclaimed stems added back to DIET blend at various rates and moistures indicated subjective differences. Additional testing was not performed because of the conversion to BLDET.
2. **Plans:** Testing will be repeated with the BLDET formula during March, 1993.
3. **Contributors:** D. Spruill, W. Bell, J. Sherron, C. Wood and P. Aument.

C. Strategy: Qualify new aftercut cylinders at the Manufacturing Center.

1. **Results:** Cylinder No.'s 5 & 6 have been subjectively qualified for production during February, 1993.
2. **Plans:** Cylinder No.'s 7 & 8 are scheduled for qualification trials during the second quarter, 1993.
3. **Contributors:** D. Spruill, W. Bell, J. Sherron, J. R. Craig, S. Rudis and R. Bowman.

XXII. Objective: To achieve subjective parity between small and large-scale operations so that sample size will be the only factor for determining whether primary samples are produced in small or large-scale in the Semi-Works.

A. Strategy: Qualify the overspray operation utilizing filler processed in large scale.

1. **Results:** A cross-functional team has been assigned to perform qualification trials in small-scale operations. To date, the team has been evaluating overspray application rate and uniformity of application.
2. **Plans:** Complete qualification of the overspray operation and begin qualification of the add-back operation.
3. **Contributors:** S. Skalak, W. Bell, T. Gannon, M. White, T. Skidmore, M. Tallman, V. Smith, V. Willis, E. Craze and K. Dudzinski.

XXIII. Objective: To establish a set of standards and operating conditions for the overtipping process in order to minimize variability and ensure the subjective and physical quality of overtipped cigarettes.

A. Strategy: Identify potential problem areas associated with the overtipping operation.

1. **Results:** The following potential problem areas were identified: Fuller XR6312 adhesive inconsistency, handling procedures, pack opening dust and paper color match-up. Action has been taken to resolve the above potential problems.
2. **Plans:** Complete pack opening design improvements and overtip color match-up during the second quarter. Generate GMP documentation for the overtipping operation.
3. **Contributors:** C. Scott, R. Bain, G. Inge, M. Smith, D. Spruill, R. Tredway and L. Wettle.

XXV. Objective: To qualify the use of natural glycerin-based triacetin as filter plasticizer for supply security and reduced cost.

A. Strategy: Evaluate analytically and subjectively natural glycerin-based triacetin and recommend its use, if acceptable.

1. **Results:** Analytical and internal subjective evaluations of natural glycerin-based triacetin have been completed. The Richmond Panel found sufficient subjective differences between control and test cigarettes and has recommended against external (POL) testing or use as an alternate filter plasticizer at this time.
2. **Plans:** Issue final report on findings. Remake cigarettes and repeat testing.
3. **Contributors:** K. Lam, R. Hale, B. Johnson, A. Finley and FTD Panel.

ALL LAMINA BLEND

XXVI. Objective: Develop a Full Flavor KS product using an all Lamina blend (no Reconstituted or Stem products).

A. Strategy: Design and develop prototypes.

1. **Results:** A series of prototypes using five (5) all Lamina blends were produced and subjectively evaluated. Based on these results one (1) blend was chosen for additional external testing. A POL test of the selected product is scheduled to be shipped the week of March 15, 1993.
2. **Plans:** Evaluate POL results and redefine product if necessary.
3. **Contributors:** H. Maxwell, L. Vinson, R. Keatts.

DISTINCTIVE FLAVORS EXPLORATORY PROGRAM

XXVII. Objective: Determine the consumer interest in the concept of "distinctively flavored" cigarettes. If the concept is viable, develop a family of flavors that deliver a characteristic and distinct flavor sensation.

- A. **Strategy:** Conduct qualitative consumer research to determine the consumer interest in this concept among select demographic groups.
 1. **Results:** In the fourth quarter, 1992, forty five (45) variants of distinctively flavored prototypes were developed in the laboratory. From these, thirteen (13) were selected for use by New York Market Research in Focus Group studies conducted in Los Angeles and Chicago. Results of these studies indicated that this is a viable concept among select demographic groups.
 2. **Plans:** No further qualitative testing is planned.
- B. **Strategy:** Conduct quantitative product testing to gauge consumer appeal, narrow/determine the field of potential flavors and to start building knowledge of smoking behavior related to "New Flavors" in April, 1993.
 1. **Results:** Aging studies are being conducted on the thirteen (13) originally developed distinctive flavors to determine their subjective stability over time. New flavors are being developed to deliver the flavor character of Liqueurs and Cordials.
 2. **Plans:** Provide New York Marketing Research with sixteen (16) different distinctively flavored products (300 cigarettes each) to conduct their quantitative research in April, 1993.
 3. **Contributors:** A. Goldfarb, J. Jones, A. Lopez, J. L. Spruill, G. N. Yatrakis.

PACK OV TARGET CONSOLIDATION

XXVII. Objective: Establish a procedure for determining 24 hour targets on a consistent basis for all current and new products.

- A. **Strategy:** Determine RH/Temperature conditions at all tobacco storage and cigarette manufacturing locations.
 1. **Plans:** Select measurement procedure and instrumentation in second quarter, 1993. Take measurements in second quarter and repeat quarterly into 1994.
- B. **Strategy:** Determine OV for each blend component at RH and temperatures determined above.
 1. **Plans:** Establish sampling, preparation and measurement procedures second quarter, 1993. Sample and measure OV/RH relationships second quarter, 1993 and repeat quarterly into 1994.
- C. **Strategy:** Determine packaging materials moisture content.
 1. **Plans:** Select representative packings and sampling procedure second quarter, 1993. Measure moisture content "as-is" and at conditions above in second quarter, 1993 and repeat as needed. Determine to what extent cigarettes and packs are at equilibrium at 24 hours in second quarter, 1993 and repeat as needed.

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D. Strategy: Establish new 24 hour pack OV targets.

1. **Plans:** Based upon brands blend and packaging composition, perform computations and set tentative targets in fourth quarter, 1993. After reviewing continuing data input, set final targets fourth quarter, 1994.

E. Strategy: Set final weigh belt OV targets.

1. **Plans:** Set tentative targets to agree with storage conditions in fourth quarter, 1993 and compare to current targets. Fine-tune to achieve 24 hour pack OV targets as these are determined.

COMPUTER-AIDED CIGARETTE DESIGN

XXVIII. Objective: Support Product Development through the implementation of enhancements to PM's computer-aided cigarette design capability.

A. Strategy: Develop and release the paper wrapper enhancements to the cigarette design model.

1. **Results:** The static burn rate and puff count models have been finalized on the basis of ca. 150 data points, which include the effect of circumference, density, chalk type, and content, basis weight, rod-density, tobacco cut-width, wrapper-additive, and wrapper-permeability. For prototype and demonstration purposes, coding of these models is underway in Excel.
2. **Plans:** The models will be integrated into the existing Cigarette Design program for release in March.

B. Strategy: Develop an enhanced filter model.

1. **Results:** An alternative approach to calculate the permeability and pressure drop of CA filters has been developed by applying the modified Darcy equation and the Blake-Kozency equation. This approach is promising for its simplicity and accuracy, as well as its potential application to other materials. A closer examination of this theoretical model is underway.
2. **Plans:** If the model is proven satisfactory after critical verification with the experimental data, it will be implemented in the existing Cigarette Design program.

C. Strategy: Determine the prospective computer architecture of the cigarette design support system.

1. **Results:** Computer Applications Division has identified the areas of investigation and developed a schedule. There are basically two forms of implementation: a single process with graphic user interface and multi-processes with remote processing capability. Physical Research Division has requested the hardware and software required for the evaluation process.

2. **Plans:** The evaluation will start as soon as the hardware and software arrive. Gradual conversion will occur after evaluation.
3. **Contributors:** J. W. Kao and K. H. Shafer

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PROGRAM NAME : International Product Development – Export – Marketplace Driven
PROGRAM COORD. : J. N. Smith
WRITTEN BY : J. Smith, R. Slagle, J. Hickie, R. Lambert, D. Sealey, B. Tierney,
 and J. Easley
PERIOD COVERED : First Quarter, 1993

Coordinator Summary: Merit Lights KS Korea has undergone extensive redevelopment, including an increase in tar to 5mg FTC, filter redesign, and the incorporation of new blend/flavor options. SCP testing will be completed in the Second Quarter 1993 for potential introduction of the optimized product.

Next KS FTB (Project 41) was produced in Cabarrus with carbon PCC filters supplied by American Filtrona. The Next brand was launched for test market in Osaka, Japan, February 1, 1993.

DIET trials were conducted in January, 1993 for Marlboro JT. Additional Danchi testing will be conducted in the Second Quarter 1993, for June, 1993 implementation.

I. Objective: Support the growth of international business through the launch of new commercial products for U.S. export to markets in Asia, EEMA, EEC, and LA/I, and through support of J.T. licensee production.

A. Strategy: Tar Delivery Reduction – In response to a decrease in sales weighted tar averages in both the Japanese and Korean markets, several brands are slated for tar reductions.

1. Results:

PMSL 100's FTB – JAPAN Interim specifications were issued in January, 1993 to reduce tar from 8.0mg to 7.0mg in order to use up purchased filter and tipping paper.

MARLBORO – KOREA Authorization has been given to reduce the current Marlboro Red KS (SP and FTB) products in Korea to 10.0mg from 12.0mg FTC when the March, 1993 orders are filled. The objective will be met utilizing a longer filtration system (27mm) and added ventilation. This reduction is intended to foster the growth of Marlboro Red in Korea, through bringing the brand family closer to the sales weighted tar average.

"Softer" Marlboro evaluations were conducted in February with Hong Kong Operations and Product Development personnel on Marlboro prototypes, which consisted of various blends/flavor systems/filter system models. Reduced throat impact could only be achieved by reduction of the burley content in the current Marlboro blend if the tar level was to remain at 12.0mg FTC. The decision to reduce the tar level to 10.0mg was authorized and prototype manufacture and factory trial were initiated to meet the tar reduction criteria.

2. Plans:

PMSL 100'S FTB - JAPAN New filters and new graphics tipping will be ordered and used to further reduce tar to desired 6.0mg level during 1993.

MARLBORO - KOREA A factory trial was conducted the week of February 22, 1993, and specifications will be formalized in early March. Manufacturing start-up will be monitored to ensure that specification requirements are being adhered to during production. Subjective evaluations will be initiated prior to shipment.

SCP testing will be initiated in late March, 1993 involving Marlboro with carbon at the 10.0mg and 8.0mg tar levels (FTC). The Marlboro blend will be utilized in this test.

Additional testing requirements to reduce the current Marlboro Lights at 7.0mg FTC to 6.0mg testing will also be under taken during this phase evaluating carbon filters at the same tar level. Recommendations for Marlboro with carbon filter systems will be evaluated for implementation after research data has been received.

3. Conclusions: All tar reductions will be carefully monitored, and appropriate modifications will be implemented, if warranted.

4. Contributors: Sealey, Easley, Parrish, Matthews, Pan Asia

B. Strategy: Packaging Revisions - Track changes in packaging of export products, specifically with respect to printed deliveries and the export warning notice program.

1. Results:

EXPORT WARNING NOTICE PROGRAM A random rotation of the four U.S. warning notices was added to 181 export packagings, which did not have local health warnings on the pack. Conversion occurred upon depletion of existing packaging materials to minimize obsolescence. The completion of change-over was December, 1992. Artwork was received on 181 brands, with approximately 181 brands in production presently. Some brands were dropped during the year.

2. Plans:

EXPORT WARNING NOTICE PROGRAM Approximately 25 brands which carried a non-caution notice are to be converted to a health warning closure instead of changing label packaging by the end of the first quarter 1993.

3. Conclusions:

EXPORT WARNING NOTICE PROGRAM 181 packings have been converted with a minimum amount of obsolescence to date.

4. Contributors: Easley

C. Strategy: Support of Marlboro licensee production by JT, including monitoring of production transfer from Odawara to Kanazawa.

1. Results:

JAPAN MARLBORO FACTORY LOCATION CHANGE The production transfer of the Marlboro brand family from JT's Odawara factory to the Kanazawa factory has been completed. The first Danchi test of Marlboro KS and Marlboro Lights KS was completed and results are currently being reviewed. Additional Danchi testing of production Marlboro KS and Marlboro Lights KS is planned for April, 1993.

2. Plans:

JAPAN MARLBORO FACTORY LOCATION CHANGE Danchi testing of Marlboro KS and Marlboro Lights KS produced in Kanazawa is scheduled to begin in April, 1993.

3. Conclusions:

JAPAN MARLBORO FACTORY LOCATION CHANGE JT's modifications to the Kanazawa factory to date are acceptable and meet PM's standards for Marlboro production in Japan. Production will continue to be monitored to ensure that the product integrity and consistency is maintained. This will be confirmed via Danchi consumer testing.

4. Contributors: Hickle, Brumberg, Parrish, Matthews, PM Asia, PMKK.

D. Strategy: Marlboro Japan DIET Development Program – Evaluate DIET inclusion in Japan Marlboro family to enhance subjective and analytical performance of the products.

1. Results:

MARLBORO JAPAN DIET DEVELOPMENT PROGRAM Two factory trials have been completed to evaluate blends incorporating JIET-2 produced in Australia in September, 1992. The blend produced during the second trial in January, 1993 resulted in acceptable analytical results using the current product design. A third trial is scheduled for the week of March 8th to optimize the reduced tar product designs for Marlboro KS and Marlboro Lights KS. All production will take place at the Kanazawa factory. Two Danchi tests are scheduled for April, 1993 to evaluate the following cigarettes:

Test #1

Marlboro KS (current production)
Marlboro KS (JIET-2 blend/current deliveries)
Marlboro Lights KS (current production)
Marlboro Lights KS (JIET-2 blend/9mg TIOJ tar)

Test #2

Marlboro KS (JIET-2 blend/current tar)
Marlboro KS (JIET-2 blend/13mg TIOJ tar)

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Marlboro Lights KS (JIET-2 blend/current tar)

Marlboro Lights KS (JIET-2 blend/9mg TIOJ tar)

PM Ltd. completed the first commercial expansion run for JIET-2 in January, 1993. The JIET-2 produced during this run will be used for the March trials.

2. Plans:

MARLBORO JAPAN DIET DEVELOPMENT PROGRAM Complete JIET-2 trials in March, 1993 and conduct Danchi testing in April, 1993. Review evaluations in Richmond and consumer testing data in order to make recommendations regarding DIET inclusion and tar reductions. Implementation of JIET-2 in the Marlboro blend is planned for June, 1993.

3. Conclusions:

MARLBORO JAPAN DIET DEVELOPMENT PROGRAM Factory trials and consumer testing will be completed in April, 1993 with results available in May, 1993. If consumer testing results are acceptable, DIET inclusion will be implemented in June, 1993. Tar reductions will follow, as warranted.

4. Contributors: Hickle, Brumberg, Parrish, Scott, Shelton, Nelson, Matthews, Roberts, PM Ltd. Australia, PM Asia, PMKK.

E. Strategy: New product launches in Japan to foster growth of PMKK and PM Licensee market share, currently over 11%.

1. Results:

MARLBORO LIGHTS MENTHOL - JAPAN PMKK has requested that a Marlboro Lights Menthol KS 9.0mg TIOJ tar white-tipped menthol product be developed for the Japanese market with a desired launch date of November, 1993. This product would be produced under license by Japan Tobacco. JT will be approached regarding this program on February 26th with more in-depth technical and business negotiations beginning in mid-March. Project management scenarios and associated timetables have been developed for two product development approaches — (1) shipping cut filler from Richmond to Japan for cigarette production and (2) development of a new blend to be produced at JT. These scenarios will be reviewed with PMKK management prior to the mid-March negotiations with JT.

VIRGINIA SLIMS MENTHOL 100 FTB - JAPAN Virginia Slims Menthol 100 FTB for Japan received CPC approval in February, 1993. This product will have limited distribution and will enable PMKK to gain an additional three years of TV advertising for the brand family. The product will be the same as Virginia Slims 100 Menthol FTB 10's currently produced for the U.S. market. Final packaging artwork is due in March, 1993.

LARK LIGHTS - JAPAN Lark Lights was developed to be an 8mg TIOJ tar product with white tipping to appeal to Mild Seven and Mild Seven Lights smokers. This product is targeted between the current Lark Milds and Lark Super Lights product lines.

NEXT KS FTB – JAPAN Additional volume requirements were produced in Cabarrus in February, 1993. This product incorporates a PCC filter (carbon on paper core) and has a 1.0mg tar target by TIOJ smoking methodology. This product was designed to achieve a superiority in liking over Frontier Lights among selected ultra low delivery smoker groups. This product was initially planned for test market only, but is now scheduled to be launched nationally in January, 1994.

LARK ULTRA – JAPAN Development and consumer testing is continuing. The goal is to have a 4mg product recommendation by the second quarter of 1994. A Lark family line extension is being considered to take part in the rapid growth of the below 6mg tar category in Japan.

MERIT ULTRA LIGHTS – Japan A 4.0mg TIOJ tar product is being developed using a high efficiency dual carbon on paper/CA filter in order to achieve parity in liking with Mild Seven Super Lights among Mild Seven Light smokers. Danchi Test 1 is in the field. Danchi Test 2 is scheduled for shipment in the first quarter of 1993. A factory trial was conducted in January, 1993 at Cabarrus.

2. Plans:

MARLBORO LIGHTS MENTHOL JAPAN Negotiate with JT and agree on a plan for this program. Expedite product development work so that this product can be launched at the earliest possible date.

VIRGINIA SLIMS MENTHOL 100 FTB – JAPAN Product specifications will be issued in March, 1993. Production start-up is scheduled for April, 1993 with a launch date of July, 1993.

LARK LIGHTS – JAPAN Since specifications were issued on February 2, 1993, production of 330 million units has been completed and shipped by sea freight for a May, 1993 launch in Japan.

NEXT KS FTB – JAPAN Future production will be monitored both analytically and subjectively prior to shipment of product.

MERIT ULTRA LIGHTS – JAPAN Results of both Danchi tests will be evaluated to determine which blend, Mount or Merit Ultima, is better suited for the marketplace. Production start-up quantities of filters, supplied by FIL International Limited, will be ordered in anticipation of an initial launch order of 200 million cigarettes.

LARK ULTRA – JAPAN Brand launch is now projected in 1994. Danchi testing has been conducted with a plug space plug filter. Further modelling and consumer testing is planned to deliver a product which achieves established objectives.

3. Conclusions:

MARLBORO LIGHTS MENTHOL – JAPAN The product launch date will be dependent on the amount of time that JT requires to prepare and qualify a factory for production. Current scenarios assume that factory trials and Danchi test production (if any) will take place prior to factory modification/qualification.

VIRGINIA SLIMS MENTHOL 100 FTB – JAPAN The U.S. FTB 10's product should be analytically acceptable for this program without any modifications. Analytical confirmation will be obtained prior to issuing specifications.

LARK LIGHTS – JAPAN Upon exhaustion of current tipping paper, design of logo will be modified on future purchased tipping paper. Packaging will also be modified for future production requests.

NEXT KS FTB – JAPAN Track brand success in Osaka test market and prepare to launch Next nationally if warranted to achieve market share in this 1.0mg tar segment of the Japanese marketplace.

MERIT ULTRA LIGHTS – JAPAN The Merit Ultra Lights national launch is planned for September, 1993.

LARK ULTRA – JAPAN Initial plug space plug models have been screened subjectively, and candidates will be chosen for potential launch, should the priority of this program be upgraded.

Further development and product screening continues. The objective has now been defined that this product test at parity to the Mild Seven Super Lights among Mild Seven Lights smokers.

The Blend #298 with Tela paper inner filter model tested well in the November Danchi. Development is intended to give a 4mg product which achieves the desired liking among the targeted smoker groups.

4. **Contributors:** Hickie, Lambert, Tierney, Sealey, Brumberg, Matthews, Laslie, Finley, Claflin, Pflueger, Parrish, Shelton, Foster, Nelson, Matthews, Newman, QE, PMKK, PM Asia.

- F. **Strategy:** New product launches in Asia, EEMA and EEC to increase market share in existing markets and establish sales in markets previously restricted to importation.

1. **Results:**

PAN ASIAN MENTHOL Alpine and Zephyr fillers were received from Australia for evaluation in this program to develop a full flavor and lights menthol family to compete with Salem and Salem Lights in the Asia region. The Leaf Department developed a new menthol blend (T-508) for the Pan Asian Menthol program. Prototypes were produced in Semiworks in January incorporating all of the above blends. Blend T-508 was produced with two different flavor systems and two menthol levels. Prototypes were evaluated in Richmond and Hong Kong. The following models were selected for Hong Kong Menthol Consumer Panel testing:

Australian Alpine model

Blend T-508 with a/c 8570-49-1

Blend T-508 with a/c 8570-49-2

Blend T-508 with a/c 8570-49-3

Tar deliveries for these models are targeted at 8mg UK method. Smoke menthol deliveries are targeted for 0.25mg and 0.35mg for the Australian Alpine blend and

Blend T-508, respectively. Test production is scheduled for the week of March 1st in Semiworks.

VISA/CONGRESS – GCC GCC Product Development of Visa/Congress Full Flavor (tar 12.0mg./nicotine 0.8mg.) and Visa/Congress Lights (tar 7.0–8.0mg./nicotine 0.6mg.) has been initiated as a contingency to supply product for the GCC export market.

Prototypes were made using the current GCC blend and Brica blend with Bucks-type A/C. The subjective preference was the Brica blend with Bucks-type A/C at reduced levels.

MERIT LIGHTS – KOREA Smoking evaluations with Hong Kong Product Development personnel initiated additional SCP testing with the focus of concentration in two areas (Flavor System and Filtration System). SCP test manufacturing in late February involved 5.0mg tar FTC products with four filter systems. Blend/flavor systems encompass the Mount/Ring A+ system and Mount with distinctive flavors. Internal smoking will screen the models for SCP testing candidates. This test will be shipped early March, 1993.

ADDITIONAL PRODUCT LAUNCHES

Virginia Product (Hilda II) Taiwan – White tipped Hilda II prototypes were received in February 1993 to test against Long Life Milds. Testing to begin in March, 1993.

Marlboro Menthol 83 FTB 10's Singapore and Brunei – Launched in January, 1993.

B&H Deluxe Lights Regular 100's FTB Taiwan – Launched in January, 1993.

Merit KS FTB Regular 10's Puerto Rico – Launched in February, 1993.

Marlboro Lights 83mm Regular FTB Asia Duty Free/5 Pack Carton – Launched in February, 1993.

L&M LS FTB converted to L&M KS FTB at 14mg tar and cork tipping for export locations.

2. Plans:

PAN ASIAN MENTHOL HKCP-M testing will take place in April with results available in mid-May. A second HKCP-M test is scheduled to be shipped in May to evaluate Salem Lights, Marlboro Lights Menthol and two of the prototypes from the above test. A fourth quarter launch is tentatively planned in Hong Kong.

VISA/CONGRESS – GCC Brica IV blend, which will replace the current Brica blend, will be further developed using Bucks-type A/C as well as Bristol and Cambridge flavor systems. Prototypes will be manufactured and evaluated for subjective and analytical criteria by Product Development and EEMA personnel.

MERIT LIGHTS – KOREA Since permission to export imported products in Korea, Mild Seven Lights has been requested for second quarter SCP testing in conjunction with successful Merit Lights SCP tested prototypes. Results from this testing will generate an optimized product for the Korean marketplace.

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ADDITIONAL PRODUCT LAUNCHES

Marlboro 100's FTB Singapore – for launch 4th Quarter 1993

Marlboro Lights KS FTB – PRC – for launch 4th Quarter 1993

Marlboro Lights 100's SP (Reduced Tar) – Korea – Relaunch 1st Quarter 1994

Marlboro Red 100's FTB to replace Marlboro 100's SP for Taiwan – April, 1993.

B&H 100's Regular and Menthol FTB and Marlboro Lights 100's FTB for Puerto Rico to replace SP versions – April, 1993.

Marlboro Medium KS SP/FTB Hong Kong – for launch 3rd Quarter, 1993.

Merit Lights KS FTB Hong Kong – for launch 3rd Quarter, 1993.

Virginia Product (Hilda) Taiwan – for launch 3rd Quarter, 1993.

Hilda II Prototypes w/Cork Tipping to be tested during 1993 against State Express 555.

Philip Morris Menthol KS FTB GCC – To be determined.

3. Conclusions:

PAN ASIAN MENTHOL HKCP Menthol testing to date has not identified a prototype suitable for this program. The Australian Alpine blend and Blend T-508 will be consumer tested in Hong Kong. Testing will be completed in June, 1993 with results available in July, 1993.

VISA/CONGRESS – GCC Optimal designs will be developed in anticipation of a decision to export these products from the U.S.

MERIT LIGHTS – KOREA SCP testing of the optimized product will be evaluated for Third Quarter 1993 relaunch of the product.

4. Contributors: Hickle, Tierney, Easley, Sealey, Jackson, Scott, Parrish, Matthews, PM Asia, EEMA, EEC.

PROGRAM NAME : International Product Development – Export – Operations Driven
PROGRAM COORD. : J. N. Smith
WRITTEN BY : J. Smith, R. Slagle, J. Hickie, R. Lambert, D. Sealey, B. Tierney,
 and J. Easley
PERIOD COVERED : First Quarter, 1993

Coordinator Summary: Total conversion to the PMCC carbon is complete for Lark. Further machinability trials (60 Drums) are planned for the Second Quarter 1994 to evaluate the PM specification coconut carbon on Parliament. Due to recent pricing information and machinability concerns, final specification recommendation is pending further qualification trials with the 18% moisturized PMTC carbon.

All Lark products, including the recently launched Lark Lights KS FTB, have been converted to the KC porous heatseal combining wrap with the exception of Lark Super Lights KS. This brand is scheduled to be converted upon depletion of the Ecusta material in April, 1993.

I. Objective: Provide support to operations with respect to existing export products in the areas of quality, cost/productivity, capacity and environmental compliance.

A. Strategy: Filter optimization improvement to existing filtration mechanisms for the purpose of reduction of product variability, cost reduction, consolidation of material specifications and productivity improvement. Development in this area is focused in carbon consolidation, porous combining wrap, and Parliament filter optimization.

1. Results:

CARBON CONSOLIDATION

Coconut Based: Subsequent trials of the Calgon PM spec. carbon exhibited machinability problems. The 20x70 sized material has a greater filling power than the 12x30 carbon currently specified. Machinability trials have resulted in an inability to achieve specified carbon loadings for the Parliament inner filter. Upon resolution of processing and pricing of the PMTC material, a final specification recommendation will be made.

Coal Based: A long term agreement to purchase PMCC carbon without iron and zinc impregnants was made. This agreement will result in annual savings of \$1.1 million.

POROUS COMBINING WRAP All Lark products have been converted to the KC porous heatseal combining wrap except for Lark Super Lights. This material has been developed to replace the Ecusta mechanically perforated heatseal combining wrap. The Ecusta material is scheduled to be depleted by April, 1993.

PARLIAMENT FILTER OPTIMIZATION In order to achieve increased filtration efficiency, models were made with FT-777 as the inner tow item on all Parliament products.

2. Plans:

CARBON CONSOLIDATION

Coal Based: PMCC carbon will continue to be purchased from Calgon for cavity filters until December, 1995. Further consolidation efforts will be evaluated during this period.

Coconut Based: Inventories of MF2C carbon are being held to a minimum in order for a quick and orderly change to PM specification coconut carbon, to be completed upon resolution of final specification.

POROUS COMBINING WRAP The remaining Lark brand to be converted is the Lark Super Lights product. Total conversion to porous heatseal should be complete by April, 1993.

PARLIAMENT FILTER OPTIMIZATION All Parliament products will have the inner tow item changed from FT-555 to FT-777 by March, 1993, in order to improve the filtration efficiency of this inner filter.

3. Conclusions:

CARBON CONSOLIDATION The moisture level target for PM specification coconut carbon has yet to be determined. Based upon recent pricing information, 18% moisturized carbon has an increased cost over the 3% moisturized material. Determination will be made as to whether the increased cost of the 18% moisturized carbon is warranted.

POROUS COMBINING WRAP Kimberly Clark porous heatseal combining wrap will be specified for all Lark plug space plug filters upon depletion of the Ecusta mechanically perforated heatseal material in early April.

PARLIAMENT FILTER OPTIMIZATION All Parliament inner filter tow item specifications will change from FT-555 to FT-777 in late March. The conversion will be completed upon depletion of inventoried components. A net filter cost reduction will be realized with use of the optimized Parliament filter.

4. Contributors: Lambert, Sealey, Finley, Laslie, Parrish, Matthews, Manufacturing Services, QA, QE, Engineering, Manufacturing.

PROGRAM NAME : International Product Dev. – Lic. & Aff. – Marketplace Driven
PROGRAM COORD. : A. H. Confer
WRITTEN BY : K. Drumwright, G. Haskins, M. Home, N. Jackson, R. Tinker,
 A. Confer
PERIOD COVERED : First Quarter, 1993

Coordinator Summary: During this reporting period, considerable effort was expended on Malaysia. Marlboro Menthol was launched in February. A Chesterfield prototype was produced in Malaysia in March, following Semiworks trials. This prototype is scheduled to be tested on the third Malaysia Consumer Panel test. Launch is planned for June 1.

In the Dominican Republic, the government-owned tobacco company signed a licensing agreement with RJR. As a defensive measure, Marlboro Lights Menthol was developed. Launch will probably not occur until Salem/Salem Lights is launched. Product Development Requests have also been received for Chesterfield and L&M Lights.

Results:

Marlboro

Malaysia: Marlboro Menthol KS was subjectively approved and launched February 23, 1993.

Indonesia: Marlboro Lights KS was launched December, 1992.

Chesterfield

Malaysia: Two prototypes were produced in Semiworks for analytical and subjective evaluation.

Virginia Slims Menthol

Philippines: Awaiting concept test results. Launch scheduled for October, 1993.

Philip Morris KS Menthol

Philippines: Proposed launch scheduled for October, 1993.

Marlboro Lights Menthol

Mexico: Prototype with current blend was approved by Richmond

L&M Lights

Costa Rica: Additional blend development will be conducted week of 2/22/93 and prototype will be produced the week of 3/1/93 for C.I. and subjective evaluations.

B&H Lights 100's FTB

Mexico: Tipping paper, cigarette paper and plug wrap have been shipped to Mexico from U.S. for prototype production.

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Plans:

Chesterfield

Malaysia: Factory trial to be run March, 1993, will include enough product to be included on Malaysia Panel Test #3.

Virginia Slims Menthol

Philippines: Factory prototype production date unscheduled at present.

Philip Morris KS Menthol

Philippines: Factory prototype production date unscheduled at present.

Marlboro Lights Menthol

Mexico: Marlboro Lights Menthol to be launched 1st quarter, 1993 completing project.

L&M Lights

Costa Rica: Evaluate new blends and cigarette construction. Make a decision on tobacco blend.

B&H Lights 100's FTB

Mexico: Produce prototypes with U.S. sourced tipping paper, cigarette paper and plug wrap for evaluations.

PROGRAM NAME : International Product Dev. – Lic. & Aff. – Operations Driven
PROGRAM COORD. : A. H. Confer
WRITTEN BY : K. Drumwright, G. Haskins, M. Horne, N. Jackson, R. Tinker,
 A. Confer
PERIOD COVERED : First Quarter, 1993

Coordinator Summary: Our operations driven product development work during this period focused on Marlboro improvement programs in six countries.

We also began a longer-term project to compile cigarette, processing, and NTM specifications for corporate brands produced by affiliates and licensees. During this compilation, we plan to review the specifications for uniformity, regulatory compliance, and conformity to U.S.A. standards.

Results:

MARLBORO

Philippines: Project Omega, Marlboro control vs. test was rejected subjectively by the Richmond Panel.

Diacel tow/triacetin qualification.

Trials to eliminate triacetin 111-X and replace it with Estrobond B.

Indonesia: BBS project delayed pending the analysis of local tobaccos for DDT, DDE. Plugwrap consolidation for MFKS and Marlboro Lights KS.

Mexico: Marlboro factory trials with U.S. sourced ingredients have been completed including a control for subjective and analytical evaluations.

Venezuela: A meeting is scheduled in Venezuela the week of 3/15/93 to discuss consumer test results using 8% Oriental and non-carbon filter.

Argentina: C.I. analysis and subjective evaluations of corporate brands (L&M, Chesterfield, B&H, Parliament) are complete. Prototypes utilize current blends with substitute licorice.

Costa Rica: Tipping paper trials complete. Leaf Department and local preference was 18cmpd tipping paper, which delivers 13% ventilation and gave the best subjective response. Increase in Colombian burley inclusion from 5% to 12% was instituted.

Plans:

MARLBORO

Philippines: Project Omega samples were remade February, 1993. Awaiting receipt for analytical and subjective evaluations.

Samples of MFKS using Diacel tow and triacetin vs. Celanese tow and Estrobond B triacetin will be produced in Semiworks 1st quarter, 1993.

Awaiting samples with Triacetin 111-X vs. Estrobond B for analytical and subjective evaluations.

Indonesia: Results of the local tobacco analysis will determine the new timetable for factory trial.

Prototypes consolidating the plugwraps for MFKS and Marlboro Lights were produced on-site February, 1993. Upon receipt, samples will be analytically and subjectively evaluated.

Mexico: Upon completion of C.I. analysis and subjective evaluations, a timetable for implementation will be established.

Venezuela: After reviewing consumer test results, decision on Oriental inclusion and non-carbon filter Marlboro will be made.

Argentina: Subjective results were inconclusive. Prototypes will be re-made to confirm subjectives on prototypes with substitute licorice. If different, blend modifications may be necessary.

Costa Rica: Monitor via C.I.'s and Leaf/IPD subjective screenings, initial production runs of the product.

I. Objective: Compile and complete cigarette, processing, and NTM specifications for corporate brands produced by affiliates and licensees.

A. Strategy: The standard U.S.A. 3-page cigarette specification will be generated by factory location and product name for all affiliates and licensees.

1. Results:

Malaysia: Cigarette specifications are completed.

Indonesia: Cigarette specifications are completed.

Aruba: Cigarette specifications are completed.

Brazil: Cigarette specifications are completed.

Costa Rica: Cigarette specifications are completed.

Panama: Cigarette specifications are completed.

Mexico: Cigarette specifications are completed.

2. Plans: To obtain specifications from the following countries: Argentina, Dominican Republic, Ecuador, Guatemala, Uruguay, Venezuela, Puerto Rico, and Philippines.

To generate processing specifications with Leaf Department's input and NTM specifications.

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PROGRAM NAME : Paper Technology
 PROGRAM COORD. : S. Baldwin
 WRITTEN BY : S. Baldwin And G. Bokelman
 PERIOD COVERED : First Quarter, 1993

Banded Paper The moving orifice device (MOD) was installed at Kimberly-Clark's Spotswood Mill to assess the potential capability of this device for wet-end application. The trials provided useful information about the slurry application capability of the device. Although band definition was not optimal, some usable paper was produced.

Gravure printing trials at Kimberly-Clark's Munising Mill met with some success. Two grades of Avicel were printed on 137-1 paper. Band definition was good, and printing speeds of 600 ft./min. were attained. Wrinkling was still a major problem.

Wood Pulp Paper Cigarettes prepared from papers having blends of wood and flax fibers were evaluated subjectively. All were found to be subjectively inferior to flax. The wood fibers were mixtures of hardwood and softwood. Additional mill trials have been scheduled to produce papers with reduced levels of wood fibers consisting only of hardwood.

Pyrolysis GC-Mass spectral analyses of these hardwood pulps prepared at the University of Maine showed that sulfur dioxide was present in the pyrolyzate of the Kraft cooked pulp, but not in that of the other two. The other pulps were prepared by sulfur-free pulping methods.

Cigarette Paper Consolidation Proposed paper specifications were provided to Purchasing for reduced numbers of cigarette papers in order to reassess potential cost savings in light of the reduced prices already attained due to partnering.

Cigarette Paper Specifications Specifications tightening calcium carbonate tolerances on existing cigarette papers were proposed to Kimberly-Clark. On its own initiative, Kimberly-Clark's Spotswood Mill has been moving its chalk target upward and has found that it can operate comfortably at $29\% \pm 4\%$ chalk. Proposed modifications to current specifications for chalk are $30.5\% \pm 3.5\%$ calcium carbonate for all papers except the 10-058A paper, which has a chalk specification of $36.5\% \pm 3.5\%$.

Evaluation of response surface data for Marlboro Lights and Ultra Lights suggests less variability for tar and puff count for papers with higher chalk levels.

Reduced Sidestream

Calcium Carbonate Paper A 44 g/m² paper with 11.5% monopotassium phosphate level and 4 Coresta porosity was produced for enhanced sidestream reduction for full circumference cigarettes.

Magnesium Carbonate Papers Machine-made cigarettes made with papers containing the aqueous non-sol-gel material prepared at the University of Maine were evaluated subjectively. No off-notes were detected, as with previous magnesium hydroxide papers or magnesite papers.

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I. Objective: Develop procedures for the application of transverse bands to cigarette paper in order to control burn rate in 1993.

A. Strategy: Participate in a joint development program with Kimberly-Clark to design and construct modifications to a papermaking machine which will allow the application of cellulose bands at or near the wet end.

1. Results and Conclusions: The moving orifice device (MOD) was installed at Kimberly-Clark's Spotswood Mill to assess the feasibility of wet end application on a commercial cigarette paper making machine. Prior trials by Kimberly-Clark's mill with a "fixed orifice device" were used to determine the process positions with the greatest potential for success. Those positions were primarily at the wet end between the dry line and the wet press. The trials provided valuable information about the application of slurries to the commercial process and some usable paper was obtained. No significant modification of the burn characteristics of cigarettes prepared from that paper was observed. In many respects, the findings of the previous Beloit trials were reflected in observations made during trials on the commercial equipment. Interference from process components touching the top surface of the bands were observed. The need to remove water from the banded regions prior to passing through the wet process was obvious. Problems with breakage were a greater problem than with the Beloit trials which were run with a higher basis weight paper.

2. Plans: Based on insights gained from these trials, further modifications to the device and to the paper machine will be made and additional trials will be conducted in early March.

3. Contributors: Product Development (H. Lanzillotti), Paper Technology (S. Baldwin)

B. Strategy: Explore the application of bands of cellulose to cigarette paper using post-fourdrinier printing applications.

1. Results and Conclusions: Gravure printing trials were conducted at Kimberly-Clark's Munising Mill with two different grades of Avicel. One contained 15% carboxymethyl cellulose and the other contained no CMC. Grade 137-1 cigarette paper with and without Hercon treatment were printed with both grades of Avicel. Printing speeds of up to 600 feet per minute were achieved during the trial. Band definition was quite good. The apparatus designed to rewet printed base paper before drying to avoid wrinkling did not perform as expected.

2. Plans: Evaluate bobbins of paper received from the trial for within band permeability and application level, as well as cigarette performance. Conduct additional printing trials in March.

C. Strategy: Develop analytical methods to measure the properties of banding materials and banded papers.

1. Results and Conclusions: An Ambertec beta formation tester, which is designed to measure paper formation by determination of basis weight variation, was

received and installed. The most critical parameter in making measurements with this instrument is the paper absorption coefficient for beta radiation. This parameter was determined using paper standards, which included cigarette papers, and was found to have excellent stability over time. A mathematical relationship was derived, analogous to the Beer-Lambert-Bouget law, which allows us to accurately calculate the basis weight differential in the banded region of banded papers.

In collaboration with D. Jones an experimental design was developed to measure uniformity within bands using the Ambertec beta formation tester. This methodology was used to examine banded paper prepared on the Fox Valley Coater with a 6% slurry concentration of Avicel modification #1. It was found that the application level increased from the leading edge to the trailing edge of the bands. The development of this methodology is significant in that it enables us to examine band uniformity without having to use dyes or marker compounds.

2. **Plans:** Work will proceed to develop an automated optical inspection system which can be used to monitor physical properties of banded paper. Work will be initiated on development of an improved permeability instrument for more rapid measurement of the banded and non-banded regions of cigarette papers. Work will be initiated to define the essential material requirements for slurries, in collaboration with Kimberly-Clark.

3. **Contributors:** Paper Technology (G. Bokelman, R. Trippet).

D. Strategy: Investigate the application of bands of cellulosic materials to cigarette paper using in-house printing techniques.

1. **Results and Conclusions:** Trial runs were conducted on the Fox Valley coater with three Avicel modifications, using gravure rollers with banded regions designed to give one band per finished cigarette with different band widths and application levels. Capability curves are being generated based on measured band widths, Greiner permeabilities, and added levels of Avicel as determined by basis weight measurements on the Ambertec instrument.

2. **Plans:** As requested, additional trial runs will be conducted on the Fox Valley coater using gravure rollers designed to give more than one band per finished cigarette.

3. **Contributors:** Paper Technology (B. Goodman, N. Gautam).

II. Objective: Evaluate the feasibility of replacing flax papers with wood pulp papers for full margin brands and develop the appropriate papers.

A. Strategy: Conduct analytical and subjective evaluations of wood and flax pulps and papers.

1. **Results and Conclusions:** Descriptive Panel testing was conducted for cigarettes made with three K-C papers containing blends of wood and flax fibers.

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Preliminary results indicate subjective differences between the flax control and all three wood/flax blend models; the blends range from 38% to 70% in wood fiber content. Mill trials have been ordered to produce papers with 15% and 25% hardwood fiber levels.

Pyrolysis analyses were conducted for three hardwood pulp samples prepared at the University of Maine. A sulfur dioxide peak was detected among the pyrolysis products for the control kraft pulp, but not for the two test pulps prepared by non-sulfur pulping methods. The analytical procedure for the mainstream gas phase smoke determination of sulfur was found to have limited sensitivity. Consequently, no meaningful data have been generated by this procedure. The analytical methodology will be reassessed.

2. **Plans:** Conduct subjective evaluations of flax/wood blend papers containing 15% and 25% hardwood fiber. Revise analytical procedures.
3. **Contributors:** Paper Technology (W. Geiszler), Flavor Technology (J. Pflueger), Analytical Research (L. Hathcock, J. Naworal).

III. Objective: Evaluate the feasibility of consolidating the seven paper grades currently being used (excluding Superslims) to four or fewer grades.

A. Strategy: Redesign cigarette papers for consolidation to four or fewer grades to maintain current tar control levels.

1. **Results and Conclusions:** Four paper designs were specified and produced for the paper consolidation program. The paper specifications model was used to project the permeability, calcium carbonate content, basis weight, and citrate level to achieve 0.6 mg increments in FTC tar delivery for Marlboro KS prototypes made with the four papers. These levels reflect the tar control requirements currently in use to adjust tar when FTC tar levels are exceeded. Alternative paper designs with these and two papers have been selected which give less control over tar. Specifications for these papers and those of the four millrun papers were provided to Purchasing to reassess potential benefits in light of current prices. Full flavor, lights, and ultra lights cigarette designs are being made with the papers to quantify the FTC tar and puff count differences afforded by the four papers at each delivery level.
2. **Plans:** Evaluate mill trial papers for FTC tar and puff count control on full flavor, lights, and ultra lights product prototypes. Develop cost comparisons for consolidation to four, three, or one paper grade.
3. **Contributors:** Paper Technology (W. Geiszler, B. Floyd, S. Baldwin).

IV. Objective: Determine those cigarette paper parameters which most affect cigarette performance and manufacturing processes and set meaningful specifications and tolerances for cigarette papers.

A. Strategy: Evaluate the effects of paper properties on cigarette performance attributes (puff count, tar, static burn time, etc.) in order to determine whether tolerances on paper

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specifications are appropriate for Marlboro or other full flavor cigarettes, including determination of paper uniformity requirements for the product.

1. **Results:** Samples of Kimberly-Clark production paper were analyzed to determine the variation of chalk in cigarette paper supplied to Philip Morris. The samples were obtained from pallets of cigarette paper being run at the Manufacturing Center, and they represented ten pallets from a number of lot dates each of grades 156 (27 Coresta, normal citrate) and 110-6 (46 Coresta, normal citrate). All individual paper samples analyzed had chalk levels within specification limits for pallet average of chalk content. Chalk measurements of the grade 156 paper averaged 27%, and statistical evaluation of the data indicate that the paper should normally vary from 24% to 31% chalk. Chalk measurements of the grade 110-6 paper averaged 29%, and statistical evaluation of the data indicate that this paper should vary normally between 24% and 34% chalk. For the higher Coresta paper, we have observed greater ranges in chalk level. Earlier evaluations have shown averages of 33% and 30% chalk for the higher Coresta paper.
 2. **Conclusions:** Samples of Kimberly-Clark cigarette paper measured to determine variation of chalk content indicate that paper supplied to Philip Morris appears to be well within current specifications for pallet average of chalk content.
 3. **Plans:** Complete the evaluation of the effect of chalk content on tar delivery of additional full flavor brands. Make formal recommendations for the specification of chalk content of cigarette paper and pallet uniformity.
 4. **Contributors:** Paper Technology (S. Baldwin, B. Floyd)
- B. Strategy:** Evaluate the effects of paper properties on cigarette performance attributes (puff count, tar, static burn time, etc.) in order to determine whether tolerances on paper specifications are appropriate for low delivery cigarettes.
1. **Results:** Production and delivery analysis of cigarettes made to Marlboro Lights KS and Marlboro Ultra Lights KS specifications are complete. Statistical analysis to generate a prediction model is complete. Evaluation of the prediction model using additional cigarette models indicates that the model predicts delivery responses of low tar cigarettes well.
- Analysis of data using the prediction model indicates that the chalk content of the paper is a significant paper parameter affecting delivery responses for low tar cigarettes. The effect of chalk content on puff count for these cigarettes was greater than the effect of any other parameter.
- For cigarettes made to Marlboro Ultra Lights KS specifications, varying the chalk content and porosity over the specification range with other parameters at target gives similar relative predictions as with Marlboro Lights. Varying chalk content results in a significant change in tar delivery. The effect of chalk content on puff count for these cigarettes was the same as for Marlboro Lights.
- As with the full flavor cigarettes, the effect of chalk at the higher end of the chalk range is less than at the lower end of the chalk range, indicating that there is less variation in tar delivery and puff count at higher chalk levels for low tar cigarettes.

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2. **Conclusions:** Chalk content and porosity are the most significant contributors to varying the delivery responses of light and ultra-light cigarettes. As observed with full flavor cigarettes, there is less delivery variation at higher chalk levels. However, as the ventilation of the cigarette increases, this effect becomes somewhat diminished as the ventilation becomes the dominant factor in determining the level of available TPM.
3. **Plans:** Complete the evaluation of the effect of chalk content on tar delivery for additional lights and ultra-lights brands.
4. **Contributors:** Paper Technology (S. Baldwin, B. Floyd) and Applied Statistics (M. Ferro, J. Tindall)

V. Objective: Develop a proprietary cigarette wrapper which will reduce visible sidestream smoke in a full circumference cigarette by 60%, compared to an appropriate control, while maintaining subjective parity.

A. Strategy: Develop calcium carbonate papers suitable for use with a Virginia Slims Lights type reduced sidestream product. Explore alternative approaches for enhancing sidestream reduction.

1. **Results and Conclusions:** Low sidestream papers at lower basis weight were treated with monopotassium phosphate and acid for increased puff count and visibility reduction, but were found to burn too slowly. Close to 60% reduction was achieved with papers containing eucalyptus fibers and Multiflex MM CaCO_3 that was treated with a lower level of monopotassium phosphate than was needed for flax containing papers.

A modified paper was produced by Kimberly-Clark for enhanced sidestream reduction compared to the paper used for previous consumer testing. Bobbins of this paper have been received, and are being analyzed for composition and additive level.

A model for predicting the extinction coefficient of low sidestream Virginia Slims cigarettes was developed using statistical regression of physical data and measured extinction coefficients of experimental models. Results of the regression analysis indicate that varying the porosity over the range in the study (3.1 to 8.6 Coresta) has a greater effect on sidestream reduction than varying either of the other two parameters over the ranges used in the study. Varying the additive level (7.7% to 12.4% monopotassium phosphate) on low porosity paper has much less effect on sidestream reduction than varying the additive level on higher porosity paper. Varying the chalk content (20.5% to 30.7%) has about the same effect on sidestream reduction at all porosity levels.

2. **Plans:** Make preliminary models with the new paper for comparison with current papers at two different basis weights. Treat additional base papers with monopotassium phosphate and low levels of acid to achieve higher puff count and greater visibility reduction.

3. **Contributors:** Paper Technology (B. Goodman, S. Tafur, B. Floyd), Flavor Technology (J. Pflueger), Product Research (J. Paine, K. Podraza), Analytical Research (K. Torrence).
- B. Strategy:** Monitor the single wrap for Regular and Menthol Superslims to achieve an average of 70% sidestream visibility reduction and maintain the current tar delivery target.
1. **Results and Conclusions:** The Superslims brand has been produced with the new 10-064A paper during the past five months. Weekly samples from QA pick-ups have shown that the cigarettes give the desired 70% visibility reduction on the eight-port instrument.

The two 8-port sidestream visibility instruments were utilized in their current locations for a comparison test of extinction coefficients. Analysis of the data showed very good agreement between the two instruments for percent visibility reduction, while variation in extinction coefficient was higher on the "experimental" unit, as was static burn time. A similar comparison will be made after the relocation of the instrument currently in the CTSD laboratory.
 2. **Plans:** Continue to monitor QA pick-ups of Superslims samples for sidestream visibility reduction, and assist in occasional Coresta determinations of the 10-064A paper. Assist in qualification of the relocated 8-port instrument.
 3. **Contributors:** Paper Technology (B. Goodman), Analytical Research (K. Torrence), PED (J. Tindall), QE/QA and Tech Services.
- C. Strategy:** Develop low sidestream papers based on composites containing hydromagnesite and brucite (i.e., the aqueous non-sol-gel process).
1. **Results and Conclusions:** Papers made at the University of Maine with aqueous non-sol-gel filler were treated with potassium succinate and used to make cigarettes in the Semiworks. Cigarettes were also made with control chalk filler papers, at comparable basis weight and Coresta values, for comparison of performance. The two papers containing the aqueous non-sol-gel filler gave sidestream visibility reductions of 62-63%. These results were slightly better than those obtained from the control calcium carbonate papers that were coated with monopotassium phosphate. The experimental models also were obtained at lower puff counts. While subjective panel evaluation indicated low taste for these models, there were no discernible off-notes attributable to the non-sol-gel filler.
 2. **Plans:** Additional subjective evaluations will be conducted by Flavor Technology personnel and flavor modifications will be examined.
 3. **Contributors:** Product Research (J. Fournier, J. Paine), Paper Technology (B. Goodman, B. Floyd, S. Tafur)
- D. Strategy:** Develop low sidestream papers based on amorphous forms of mag carbonates (i.e., the aqueous sol-gel process).

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1. **Results and Conclusions:** A series of "sol-gel" compositions were prepared by reacting magnesium bicarbonate-magnesium acetate solution with differing proportions of potassium hydroxide. Each sol-gel sample is being evaluated at a 15% level as part of a dual filler handsheet that also includes 15% of Multifex MM, RSA chalk (or Albacar), or Microna 3. Each dual filler paper system is also being evaluated at two different porosity ranges (4.5-6 Coresta and 7.5-9 Coresta). Paper additive levels were targeted at 6% potassium succinate. The hand-made cigarette models evaluated so far provide sidestream reductions ranging from 33% to 63% with static burn times ranging from 7.3 to 9.4 minutes.
2. **Plans:** Evaluations will be completed on all hand-made cigarette models.
3. **Contributors:** Product Research (J. Fournier, J. Paine), Paper Technology (B. Goodman, B. Floyd, S. Tafur)

VI. Objective: Develop a modified cellulose polysaccharide incorporating a covalently bound flavorant for incorporation into the wet end of the papermaking process so the flavorant will be thermally released when a cigarette is smoked.

A. Strategy: Develop a vanillin-cellulose derivative for the production of papers for machine-made cigarettes.

1. **Results and Conclusions:** At our request, Aqualon examined different reaction conditions for the production of a vanillin glycidyl ether of cellulose using cotton linters or wood pulp. Reactions conducted in protic solvents such as alcohol will not be pursued.

An acetal-protected vanillin derivative of wood pulp was successfully prepared by Aqualon. Pyrolysis GC/MS showed equal amounts of vanillin and vanillin propylene glycol acetal. Deblocking of the acetal with mild acid has been tried and preliminary data suggest the acetal has been removed without degradation of the cellulose.

2. **Plans:** Pending analyses of the deblocked sample, flavor clearance will be pursued to enable scaled-up production of the material.
3. **Contributors:** Product Research (G. Chan), Analytical Research (J. Wooten, J. Naworal), Paper Technology (S. Tafur).

PROGRAM NAME : Filter Technology
 PROGRAM COORD. : K. Newman
 WRITTEN BY : K. Newman/J. Hearn
 PERIOD COVERED : First Quarter, 1993

Coordinator Summary: With regard to new/unique filter constructions and the development of manufacturing processes and operations to produce filters from new filter media, filter webs comprised of cotton/CA/CA fibrils were produced to assess the physical and analytical performance of increased fiber surface area. No improvements in rodmaking quality, variability, or filtration efficiency over 75/25 CA/Softwood PM web were found. Collaboration with DuPont on the production of Tencel webs designed to improve filtration efficiency through increased fiber surface area using DuPont's "Sontara" process was pursued. Additionally, based on early results of increased filtration efficiency of webs with meltblown polypropylene laminates, additional samples of high surface area meltblown materials laminated on cellulosic substrates were requested to evaluate sensory aspects of non-polypropylene materials.

In the area of new filter configurations, the effects of a nonwrapped core in a paper core concentric filter were evaluated. Equivalent filtration efficiency and analytical results were achieved, however, subjective smoking differences were cited. Commercially produced CA/carbon paper filter systems were developed for the Merit Ultra Lights Japan product. Filters supplied by Filtrona International Limited were tested on prototypes for blend selection. A factory trial was conducted at Cabarrus. Computer models which describe the filtration and adsorption properties of current production filters and will aid in the design and evaluation of new filter concepts were pursued. The computer modeling team was supplied with existing vendor/PM data related to carbon adsorption parameters, particle sizes, moisture content, and densities. Also, measurement of plug-space-plug filter RTDs at various carbon loadings in vertical and horizontal positions was completed and given to the modeling team for additional modeling.

In the area of tow material developments to improve analytical and/or physical characteristics, samples from Courtaulds' Tencel spun cellulose fiber were received for initial comments. Also, support was provided to the tow weight reduction program. Samples of FT107 and FT777 tows were submitted to Flavor Technology for GC headspace analyses of residual volatile compounds. The rate of loss for volatiles was demonstrated to be the same for both tow items. Fibers which have unique selective filtration properties were pursued with Celanese to incorporate several suggestions made by Philip Morris R&D to improve the reproducibility of their polymer screening process. Celanese continues to screen polymers to determine their selective filtration properties. Filter Technology also provided support to the carbon recycling programs at the Manufacturing locations. Reclaimed carbon collected from MULFI combiners was tested for machine oil contamination with no contamination found in the samples and recycled carbon was tested for deviation from incoming carbon specifications.

Finally, innovative packaging designs, materials and manual fabrication skills to support new product introductions, strategic goals and existing brand improvements were pursued. Available technologies and packaging materials were evaluated for their applicability to biodegradability. Filter Technology continued to participate as an R&D representative on the Engineering Packaging

Innovation Team. Over 1,260 packs of different designs were prepared for consumer research testing. Filter Technology personnel also provided assistance in the field during the testing to provide reworking of packs as required.

I. Objective: Develop novel cigarette filtration systems which offer the consumer perceived benefits when incorporated into new cigarette systems.

A. Strategy: Investigate new/unique filter constructions. Develop manufacturing processes and operations to produce filters from new filter media.

- 1. Results:** Produced filter webs comprised of cotton/CA/CA fibrids at the University of Maine to assess physical and analytical performance of increased fiber surface area. Bobbins with various inclusion levels were produced and have been evaluated. No improvements in rodmaking quality, variability, or filtration efficiency over 75/25 CA/Softwood PM web were found.

Collaborated with DuPont on the production of Tencel webs designed to improve filtration efficiency through increased fiber surface area using DuPont's "Sontara" process. Web samples with varying basis weights, entangling energy and wire patterns and one sample of two-phase Tencel paper with hydroentangled Tencel fiber were received for evaluation.

Based on early results of increased filtration efficiency of webs with meltblown polypropylene laminate produced by Hollingsworth & Vose, additional samples of high surface area meltblown materials laminated on cellulosic substrates were requested to evaluate sensory aspects of non-polypropylene materials.

- 2. Plans:** Discontinue evaluations of cotton and fibrids in a CA/cellulose web design. Evaluate comparative filter performance of webs produced with DuPont "Sontara" process. Identify desirable laminate polymers, such as ethylene vinyl acetate, PET and PBT polyester and request samples for a cost/benefit analysis of the proposed materials. Identify capability of H&V to produce finished webs with suitable filtermaking properties. Investigate other resources, such as Kimberly-Clark and Eastman which may employ technologies for producing high surface area fibers.

- 3. Contributors:** D. Laslie, K. Newman, W. Edwards, P. Gauvin, N. Gautam, D. Hayes

B. Strategy: Develop new filter system materials to obtain high efficiency/low ventilation or other unique filtration capabilities.

- 1. Results:** Investigated the effects of a nonwrapped core in a paper core concentric filter. Filters without plugwrap on the core were provided by American Filtrona and were compared to the standard Merit Ultima filter. Equivalent filtration efficiency and analytical results were achieved, however, subjective smoking differences were cited.

Evaluated commercially produced CA/carbon on paper filter systems on Merit Ultra Lights Japan product. Filters supplied by Filtrona International Limited

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were tested on prototypes for blend selection. A factory trial was also conducted at Cabarrus. Four pallets of filters were received for further evaluation of the FIL process capability.

Measured the performance of a paper core concentric filter in a 23.0mm circumference product configuration. Filter specifications were prepared and forwarded to AFC for additional trial quantities. Garniture tooling has been acquired for dual filter combining at AFC. Tow items and web widths are being evaluated to achieve the desired pressure drop targets.

2. **Plans:** Identify the relative contributions of the core to the periphery for filtration efficiency on non-wrapped paper core concentric filters. Investigate flow patterns which may produce equal subjective response. Determine costs/benefits. Refine filter specifications to suit product requirements.

Receive filter samples from AFC and make reduced circumference prototypes with control and test filters in Semiworks for comparative testing.

3. **Contributors:** D. Laslie, B. Monahan B. Tierney, G. Kuhn, J. Griffin, P. Strang, D. Hayes

- C. **Strategy:** Develop computer models that will describe the filtration and adsorption properties of current production filters and will aid in the design and evaluation of new filter concepts.

1. **Results:** Provided the computer modeling team with existing vendor/PM data related to production carbon adsorption parameters, particle sizes, moisture content, and densities. Measurement of plug-space-plug filter RTDs at various carbon loadings in vertical and horizontal positions was completed and given to the modeling team for additional modeling.

2. **Plans:** Gas phase adsorption data will be generated on plug-space-plug samples in vertical and horizontal positions at several carbon loadings. Standard cigarette data will be generated for the same set of samples in horizontal positions only. Requests will be submitted to Semiworks for carbon-on-tow cigarette samples at various carbon loadings.

3. **Contributors:** A. Finley, J. Kao, T. Nguyen, D. Hayes

- II. **Objective:** Modify CA or develop other tow materials to improve analytical and/or physical characteristics.

- A. **Strategy:** Investigate tow manufacturing processes to improve costs.

1. **Results:** Samples from Courtaulds' first attempt at making a crimped, integrated tow band of Tencel spun cellulose fiber were received for initial comments. Wet crimped and dry crimped samples were provided. Dry crimped samples have a retained crimp appearance much like CA tow.

2. **Plans:** Assess the willingness of Courtaulds to produce larger trial quantities for filtermaking evaluations. Examine the feasibility of production and

costs/benefits. Estimate when tow materials would be available for further evaluations.

3. **Contributors:** D. Laslie, K. Newman, W. Edwards, N. Gautam, P. Gauvin, D. Hayes

B. Strategy: Provide support to the tow weight reduction program.

1. **Results:** Samples of FT107 and FT777 tows were submitted to Flavor Technology for GC headspace analyses of residual volatile compounds. The rate of loss for volatiles was demonstrated to be the same for both tow items.
2. **Plans:** Meet with tow suppliers to review various options for additional optimization of the current tow item mix.
3. **Contributors:** J. Hearn, R. Hale, A. Palmer, D. Hayes

III. Objective: Investigate alternate methods and materials to provide the required plasticizing/hardening characteristics on conventional cigarette smoke filters.

A. Strategy: Investigate natural-based glycerine-type triacetin as an alternative to the triacetin currently used.

1. **Results:** Hardness measurements were completed during the 4th quarter, 1992. Subjective evaluations resulted in the Unichema product being eliminated from consideration. Additives will not be needed to make the Celanese natural glycerine-triacetin subjectively comparable to Estrobond-B. A POL will not be needed to qualify the Celanese product.
2. **Plans:** Flavor Technology will meet with management personnel to determine if this replacement strategy will be discontinued or if the Celanese 100% natural product will become qualified upon approval by the Richmond Panel.
3. **Contributors:** K. Deane, A. Finley, R. Hale, K. Lam, S. Ruziak, D. Hayes

IV. Objective: Investigate and develop materials to alter the selective filtration characteristics of cigarette smoke filters.

A. Strategy: Develop fibers which have unique selective filtration properties.

1. **Results:** Celanese has incorporated several suggestions made by Philip Morris R&D resulting in improved reproducibility in the polymer screening process. Celanese continues to screen polymers to determine their selective filtration properties.
2. **Plans:** Maintain close communications with research personnel at Hoechst/Celanese. Meet with Celanese in mid-March for an update on polymer screening.
3. **Contributors:** A. Finley, P. Gauvin, K. Newman, J. Hearn, B. Edwards

B. Strategy: Provide Filter Technology support to carbon recycling programs at the Manufacturing locations.

1. **Results:** Reclaimed carbon collected from MULFI combiners was tested for machine oil contamination with no contamination found in the samples.

Recycled carbon was tested for deviation from incoming carbon specifications. Moisture levels were within specifications and sieve size analyses showed a small reduction in average particle size with higher percentages of dust in the pan. Specifications were adjusted for reclaim carbon to allow up to 10% dust in the pan when the carbon is added back at no greater than a 10% level. Changes in the proposed ripper/reclaim system should eliminate the dust, paper, and CA found in the reclaimed carbon. The pneumatic feed and dust collecting systems on the plug-space-plug combiners can eliminate the above problem on the existing reclaim system and serve as a backup for the new ripper/reclaim system. Subjective tests show no significant differences between 100% reclaimed carbon filtered cigarettes and control cigarettes with fresh carbon. Actual blend-off levels are being determined.

2. **Plans:** Test reclaimed carbon from MULFI combiners using the proposed replacement 20X70 carbon to determine deviations from incoming specifications.

3. **Contributors:** A. Finley, R. Lambert, A. Palmer, K. Deane

V. Objective: Provide innovative packaging designs, materials and manual fabrication skills to support new product introductions, strategic goals and existing brand improvements.

A. Strategy: Develop packaging that more easily degrades after use than the current packaging. Conceivably, this could be achieved by developing new adhesive systems for paper fiber and/or fiber formation into packages.

1. **Results:** Information requested from Poly-Bond, Inc. to determine their capabilities in the technology of adhesive application to webs and films was not received. Contact has been re-initiated so that their technologies and applications can be evaluated.

Film samples requested from Planet Polymer Technologies were not received. Efforts are continuing to determine reasons/issues for the slow response from this vendor.

2. **Plans:** Continue efforts to identify a vendor who has a process for making a molded pack from paper fibers.

Continue evaluating available technologies and packaging materials for applicability to biodegradability.

3. **Contributors:** J. Hearn, R. Newsome, A. Gergely, Z. Washington

B. Strategy: Manually fabricate innovative packaging designs to support the development of new brands and improve existing brands.

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1. **Results:** Filter Technology has continued to participate as an R&D representative on the Engineering Packaging Innovation Team. Over 1,260 packs of different designs were prepared for consumer research testing. Filter Technology personnel provided assistance in the field during the testing to provide reworking of packs as required.
2. **Plans:** Continue to provide support in the form of mock-up fabrication, conceptualization, and participation on the Packaging Innovation Team. Provide packaging mock-ups to PED for Consumer Research testing in second or third quarter of this year. Assist and provide technical expertise to activities addressing the application of graphics to drawn aluminum packages. Continue to monitor innovative packaging materials/concepts available in the literature and through trade shows and other professional contacts.
3. **Contributors:** J. Hearn, R. Newsome, Z. Washington, A. Gergely

PROGRAM NAME : Packaging Technology
 PROGRAM COORD. : R. Cox/C. Kroustalis
 WRITTEN BY : Contributors
 PERIOD COVERED : First Quarter, 1993

I. Objective: To qualify an offset printing system for use on promotional items and low volume or price value brands.

A. Strategy: Evaluate the feasibility of using low odor UV printing inks.

1. **Results:** Experimental lab samples printed with various levels and coverage of low odor UV ink and lacquer subjectively indicated that there was no interaction between ink and lacquer. Subjective differences became barely significant between 50 and 100% of ink coverage. These results were very promising because this test simulated a worst case situation. As a result, this ink system was used to print the Marlboro Adventure Team half carton promotional. All promotional items printed for the Marlboro Adventure Team program were subjectively acceptable and they were released for use. Two other test promotional items were subjectively unacceptable. However, their pedigree was questionable: in one case, press practices were not clear; and in the other, the paper substrate used had shown subjective unacceptability. The Analytical Research Division has assigned an analytical team to investigate the most appropriate methodology needed for evaluating this system.
2. **Plans:** Complete analytical and subjective evaluations of a second set of experimental samples printed at AGI, which simulates the first experiment. Develop suitable analytical methodology for evaluating this system. Print additional test samples to further characterize the system and develop specifications for printing.
3. **Contributors:** B. Mait, R. Dunaway, E. Gruca, J. Stargardt, C. Kroustalis, J. Tindall, N. Jensen, C. Keene, R. Kinser, J. Lyons-Hart, J. Naworal, S. Yang, T. Sumpter, E. Thomas, G. Vilcins, K. Podraza and FTD Packaging Panel.

II. Objective: To qualify a waterborne ink system for use on printed packaging materials for fast flow inventory and vendor emissions compliance.

A. Strategy: Evaluate the feasibility of using waterborne inks in PM primary packaging materials.

1. **Results:** Saratoga Regular 120 cartons were produced using waterborne inks. These cartons were subjectively acceptable and they were used for the February, 1993 production of Saratoga. Several red waterborne inks have been evaluated subjectively and have been qualified for use. In addition, a black waterborne ink has been qualified for use up to 10% coverage.

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2. **Plans:** Coordinate activities with Purchasing Technical Services (PTS) for Marlboro carton press trial evaluations and qualifications of waterborne inks. Begin analytical investigations for methods development.

3. **Contributors:** B. Mait, R. Dunaway, PTS and FTD Packaging Panel.

III. Objective: To determine the impact of overwrapping cigarette packs with alternate film materials.

Results: Extended storage testing of the metallized film used with Merit Menthol continues. Testing continues under ambient, cold and warehouse conditions. The Semi-Works panel continues to subjectively evaluate the products. Another storage study is in progress for the evaluation of multiple film layers on product stored under ambient, cold and desert conditions.

Plans: Complete studies, report findings and make recommendations to Quality Engineering.

Contributors: B. Mait, P. Thomas, C. Crawley, W. Rech, J. Gear and FTD Panel.

IV. Objective: Provide support for the qualification of new packaging materials used in new brands, line extensions, graphics changes and promotional programs.

A. Strategy: Evaluate new packaging materials for subjective acceptability and make recommendations.

1. **Results:** The following items were evaluated and qualified for use:

New carton and pack graphics for the Basic product.

Three-layer pack coupon for Marlboro Medium.

Westvaco Eagle (partially recycled paper) for blanks and cartons.

Cambridge carton coupon.

B&H Special Kings hat promotional offer.

Marlboro Adventure Team (FF FTB, Lights 85 & 100 FTB and Medium 85 FTB) half cartons.

2. **Plans:** Continue providing support for the qualification of new packaging materials as needed.

3. **Contributors:** B. Mait, R. Dunaway, P. Thomas, PTS, FTD Analytical and Packaging Panel.

PROGRAM NAME : Tobacco Technology
WRITTEN BY : W. P. Hempfling and R. W. McCuen
PERIOD COVERED : First Quarter, 1993

Coordinator Summary: The gene of tobacco putrescine methyltransferase has been completely sequenced, and was found to share homologies with those of known methyltransferases.

The small-lamina cycle at MZM, and the oriental cycle at the Stockton Street facility, were found to be unsuitable to allow phytosanitary certification for export cut filler using tobacco conditioning.

Some 32% of insect-related customer complaints received from Product Audit were found to involve cigarette beetles.

Much of the First Quarter's activities were devoted to the identification of business issues to be addressed by members of Tobacco Research, and formulation of specific goals and strategies necessary to resolve those issues. These tasks were accomplished through the efforts of teams newly organized in the areas of Tobacco Agronomy and Biochemistry, Tobacco Stabilization and Storage, and Tobacco Structure. Written and oral presentations of the results were presented to the Leadership Team of the Applied and Basic Research Directorates. During the present period of transition, ongoing work continued under existing objectives, and progress is reported here according to those goals.

TOBACCO AGRONOMY AND BIOCHEMISTRY

I. Objective: Participate in the Cooperative Tobacco Variety Evaluation Program.

A. Strategy: Conduct cooperative subjective and chemical evaluations of submitted flue-cured and burley tobacco samples. Communicate results to Variety Evaluation Committees and other organizations as required.

1. Results:

Flue-Cured Varieties: Five entries (Reams M-1, RGA-9, Speight G-126, NC 9140 USDA and NK 939) were judged eligible for release in 1993 by the Flue-Cured Tobacco Variety Evaluation Committee. Twelve of 28 experimental entries in the 1992 Flue-Cured Tobacco Regional Small Plot Test are eligible for advancement to the 1993 Regional Farm Test. The 1993 Regional Small Plot Test will examine some 33 entries.

Other subjective, chemical and physical tests were completed on approximately 550 samples, and the results communicated to the requestors.

Burley Varieties: Evaluations were performed with the Leaf Department on some 615 tobacco samples in cooperation with the Burley Tobacco Variety Evaluation Committee, including materials from the Regional Sucker Control Tests.

2. Plans: Continue participation in industry cooperative efforts.

3. Contributors: R. Bass, G. Newell, G. West

4. References:

1. Bass, R. PM Notebook No. 8999.
2. Newell, G. PM Notebook No. 9090.
3. West, G. PM Notebook No. 8559.

II. Objective: Complete work necessary to support patent position concerning biochemical modification of tobacco to achieve reduction of alkaloid content (PMT-based modification).

A. Strategy: Express the antisense of the DNA sequences for PMT in tobacco plants.

1. **Results:** Forty-two transgenic plants containing either antisense PMT inserts or controls were sampled to determine alkaloid contents. The samples are in frozen storage pending analysis.

The base sequence of the putative PMT gene has been completely determined. That sequence was translated into the corresponding amino acid sequence and compared to the protein data base in DNASTar. There was significant homology with other known methyltransferases.

2. **Plans:** Complete sampling regimen and associated alkaloid analyses. Document results of PMT gene sequence study. Complete alkaloid analyses.
3. **Contributors:** D. Ayers, T. Michalik, M. Shulleeta, G. West

4. References:

1. Michalik, T. PM Notebook No. 9216.
2. Shulleeta, M. PM Notebook No. 9132.

TOBACCO STABILIZATION AND STORAGE

III. Objective: Provide entomological technologies to Philip Morris USA for all aspects of cigarette beetle (CB) control.

A. Strategy: Develop a better understanding of the CB's response to methoprene.

1. **Results:** The responses to methoprene of feral CB populations collected from various warehouse sites continue to be monitored.
2. **Plans:** Increase the number of sites where CBs are collected and measure their responses to methoprene. Determine if synergy exists between methoprene and other potential CB control agents (*e.g.* Nylar).
3. **Contributors:** D. Coar, T. Burruss
4. **References:**
 1. Coar, D.L. PM Notebook No. 9227.

B. Strategy: Use conditioning instead of methyl bromide to obtain phytosanitary certification of export cut filler.

1. **Results:** Tests to measure the efficacy of CB killing were performed on the small-lamina conditioning cycle at MZM in McKinney, VA and on the oriental cycle at Stockton Street. CB survivors were found using either cycle.
2. **Plans:** Recommend changing the conditioning cycles to Technical Services personnel. When the changes have been implemented, retest the conditioners for CB efficacy.
3. **Conclusion:** The conditioning cycles that were tested were not effective in killing all life stages of the CB.
4. **Contributors:** M. Tickle, T. Burruss, D. Faustini
5. **References:**
 1. Burruss, T. PM Notebook No. 8896.

C. Strategy: Support Quality Assurance personnel in the area of insect-related customer complaints.

1. **Results:** Nineteen potential insect-related customer complaints were examined. Eight were found to be related to cockroaches, six were due to CBs and in the remainder of the complaints no insect infestations could be found.
2. **Plans:** Continue to examine potential insect-related customer complaints at the request of Product Audit personnel.
3. **Conclusions:** Of the insect-related customer complaints, 32% were found to involve CBs.
4. **Contributors:** D. Coar
5. **References:**
 1. Coar, D. PM Notebook 9227.

IV. Objective: Develop appropriate methods and evaluate the microflora in tobacco and other pertinent materials.

A. Strategy: Determine microbiological activity in tobacco materials.

1. **Results:** "Wet Tobacco Materials" (WTM) from the Manufacturing Center were evaluated for susceptibility to microbial growth under permissive conditions. Even though OV values exceeded 25%, no evidence of net population increases was found over a period of at least one week.
2. **Plans:** Explore the causes of the absence of bacterial growth.
3. **Contributors:** D. Chadick, N. Thompson.

4. References:

1. Chadick, D. PM Notebook No. 9044.
2. Thompson, N. PM Notebook No. 8779.

B. Strategy: Determine microbiological activity in other direct materials.

1. **Results:** At the request of Flavor Technology, samples of a flavor formulation in storage were examined for evidence of microbiological activity. No growth of bacteria, yeast or mold was detected after incubation under permissive conditions. Results were communicated to the requestor.

At the request of Technical Services, samples of water-based adhesive materials (tow anchor, carton end, side seam) were subjected to tests of the efficacy of the preservatives that they contain. This work is in progress.

2. **Plans:** Continue to respond to requests.
3. **Contributors:** D. Chadick, N. Thompson.
4. **References:**

1. Chadick, D. PM Notebook No. 9044.
2. Thompson, N. PM Notebook No. 8779.
3. Chadick, D. Evaluation of microorganisms in Flavor #00-220. Memo to S. Ruziak; 1993 February 3.

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PROGRAM NAME : Smoke Technology
PROGRAM COORD. : R. Jenkins and D. Leyden
WRITTEN BY : R. A. Comes and P. F. Grantham
PERIOD COVERED : First Quarter, 1993

Coordinator Summary: Project teams have been formed to support the development of new products through the characterization of cigarette smoke and its relationship to cigarette design and consumer acceptance. These teams have identified internal customers and customer needs were defined. As a result, objectives and strategies have been outlined as they relate to Smoke Research expertise.

I. Objective: Support the development of new products through the measurement and characterization of cigarette smoke and its relationship to cigarette design and consumer acceptance.

A. Strategy: To develop an outline of objectives and strategies focusing on necessary information and resources relating to defined programs.

1. Results: Project teams were identified and chartered. The teams participated in training sessions on "Team Dynamics" and "Effective Meetings." Teams identified customers. Customer needs were defined and were transformed into objectives and strategies relating to available Smoke Research expertise. The results of the team efforts were presented to the Directors of Applied and Basic Research and to the Managers of the Product Research and Analytical Research Divisions.

2. Plans: Develop Operational Plans based on established priorities.

3. Contributors: Smoke Research

B. Strategy: Coordinate efforts to relocate members of Smoke Research.

1. Results: Efforts to relocate appropriate individuals, instrumentation and computers are in progress. Laboratory modifications are ongoing or are in the planning stages and are necessary to initiate research efforts.

2. Plans: Continue to relocate personnel and instrumentation as necessary. Coordinate with required Administration Services personnel to accomplish modifications.

3. Contributors: Smoke Research

PROGRAM NAME : Sensory Technology
 PROGRAM COORD. : R. A. Carchman
 WRITTEN BY : F. Beers, F. Gullotta, C. Hayes, J. Seeman, W. Reininghaus
 PERIOD COVERED : First Quarter, 1993

Coordinator Summary: The reestablishment of the Sensory Physiology Laboratory is nearly completed at INBIFO. With the redeployment of various sensory functions within the newly created Product Research Division and to INBIFO, a review of sensory technology "toolbox" issues is being undertaken. As part of an effort to enhance the sensory properties of our products, various nicotine/minor alkaloid/menthol composition studies are being initiated. Recent theoretical results on nicotine/water hydrates are being evaluated for use in the development of experimental sensory studies.

I. Objective: To develop the technology to produce low alkaloid and low tar/low alkaloid cigarettes that have sensory characteristics superior to currently available products.

A. Strategy: Develop a fundamental understanding of how nicotine affects frog sensory systems.

1. **Results:** A concentration response curve for the electro-olfactogram of frogs has been determined for (R)- and (S)-nicotine. At concentrations up to 70 mg/l, (R)-nicotine stimulation resulted in 20 to 30% higher responses, as compared to (S)-nicotine. At higher concentrations, the responses to (R)- and (S)-nicotine seemed to saturate.

The laboratory space for Sensory Physiology is currently being prepared and should be completed by mid-April. Eight model cigarettes with tar delivery of 16 mg/cigarette and ranging in nicotine from approximately 0.12 to 1.4 mg/cigarette are being prepared in order to develop a nicotine/evoked potential (EP) curve. Additionally, a research proposal is being developed addressing: (1) whether minor alkaloids have electrophysiological and subjective effects similar to nicotine; and, (2) the electrophysiological and subjectively interactions of such alkaloids with nicotine.

2. **Plans:** Differentiate between olfactory and trigeminal activity in the frog electro-olfactogram. Conduct subjective evaluations of purified (S)- and (R)-nicotine using olfactometer-generated stimuli. Complete preparation of laboratory space for Sensory Physiology and install instruments. Complete fabrication of appropriate cigarette models for generation of a nicotine/EP curve. Begin electrophysiological and subjective investigations of minor tobacco alkaloids. Conduct collaborative studies with the Kobal group on cognitive-evoked potentials to odorants. Establish a patch clamp-recording facility in Erlangen in order to study selected compounds with neuronal cell cultures.

3. **Contributors:** INBIFO, Erlangen, Product Research, Flavor Technology.

B. Strategy: Investigate the hydration state of nicotine.

1. **Results:** The physical chemical behavior, e.g. P-V-T and activity coefficient, of nicotine in water strongly suggests that it is a typical hydrophobic solute. Such solutes are generally considered to be structure makers in water, with many forming hydrates that can be isolated at sufficiently low temperatures (at higher temperatures such hydrates are thought to persist only in a time average sense). Monte Carlo simulations were undertaken to explore the effect of nicotine on water structure.

Statistics, which included both water-water and nicotine-water radial distributions, pairwise energy distributions, and binding energy distributions, were obtained over the course of a 3 million iteration Monte Carlo run of one nicotine solute in 108 water molecules. For this simulation the nicotine molecule remained fixed with regard to position, orientation, and conformation which was the minimum energy conformation from an MNDO calculation. The starting configuration for this statistical run was obtained by first running a face-centered cubic configuration of 108 waters to 3 million iterations (broken into a 1 million equilibration run and a 2 million iteration statistical run) followed by a 1 million iteration void-volume run to carve out a hole in the waters large enough to accept the nicotine solute and, finally, a 1.5 equilibration run of the nicotine in water ensemble.

The nicotine-water radial distributions indicated an overall hydrophobic reaction between the nicotine and water reminiscent of propane-water interactions. The absence of significant hydrogen bonding between the nicotine and water was indicated by the large radial distances between nicotine atomic sites and both oxygen and hydrogen sites of the waters as well as no hydrogen bond valued energies in the nicotine-water pairwise energy distribution. Due to the poor nicotine-water (particularly with the pyridine nitrogen) interaction, there seems to be no mechanism to drive a conformational change of nicotine in water.

2. **Plans:** Present the above results at the April Sensory Technology meeting. Define a program to evaluate the sensory effects of varying aerosol compositions of nicotine/water/humectants/pH.
3. **Contributors:** Technology Assessment, CAD, Physical Research

PROGRAM NAME : Consumer Research Technology
PROGRAM COORD. : M. A. Jeltema/J. A. Jones
WRITTEN BY : Contributors
PERIOD COVERED : First Quarter, 1993

Coordinator Summary: Plans are progressing according to schedule.

DOMESTIC

I. Objective: Design and implement programs to study and monitor consumers' issues/desires. Understand factors affecting smokers' attitudes about smoking. Identify new issues as they arise.

A. Strategy: Determine whether smoke styles questions (attitude, behavior, and lifestyle) can be used to determine interest in new concepts/issues and to segment market.

1. Results: Research continues to show that attitude is important to predicting consumer interest in product ideas. Preliminary data also indicate that lifestyle and behavior are also important contributors. Results of research to date are being compiled.

2. Plans: Preliminary data from the LS/LO study will be analyzed to investigate the most useful ways of relating attitude and lifestyle questions. Plans for future research will be based on those findings.

3. Contributors: P. Callahan, J. Gear, M. Jeltema, J. Jones, C. Kuesten

B. Strategy: Identify variables associated with early-stage triers of new products.

1. Results: Data from previous research on group leaders and trend setters are being gathered.

2. Plans: Research conducted to date will be discussed and future research proposed.

3. Contributors: B. Bittner, D. Ennis, M. Jeltema, J. Jones

II. Objective: Generate and evaluate new ideas which will address consumers' issues and add value to our existing or new products.

A. Strategy: Generate, consumer evaluate, and refine new product concepts to provide R&D and Marketing with future directions for potentially viable consumer driven products; assess the ideation procedure for future use in PM U.S.A. and International.

1. Results: The Concept Ideation Team has been formed. Phase I, brainstorming of core concepts has been completed.

2. Plans: Phase II, core concept screening will be conducted week of February 29.